THE GAS JOURNAL

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A Glance at the Contents—

Complete Gasification.

Dr. A. E. Dunstan, Chief Chemist to the Anglo-Persian Oil Company, has faith in the future of the complete gasification of coal. [p. 260.]

Exhibition of Chemical Products.

Imperial Chemical Industries, Ltd., are staging an exhibition of their products of interest to architects, builders, and contractors. [p. 261.]

Glover-West Verticals at Bangor.

An article from "West's Gas" reproduced to-day describes the working of Glover-West continuous vertical retorts in this Irish borough. [p. 265.]

Distribution Superintendent Required.

The Alloa Corporation are inviting applications for this post. Applicants must be fully qualified in all branches of gas distribution and sales of gas. [Supplement XI.]

Distillation in Internally Heated Rotary Retorts.

This subject is discussed by Mr. Harald Nielsen in a paper before the Institution of Chemical Engineers, with reference to the "L. & N." process. [p. 270.]

New Premises at Rotherham.

Described to-day is the latest enterprise of the Rotherham Gas Department in the erection of new showrooms, offices, and extended workshops at a cost of just under £25,000, including equipment. [p. 263.]

History and Development of Yarmouth.

The Presidential Address of Mr. P. D. Walmsley, Managing Director to the Great Yarmouth Gas Company, is published. He gives some valuable data on the results of gas drying and naphthalene removal. [p. 266.]

A Centenary Celebration.

The second gathering in connection with the celebration of the centenary of the Hastings and St. Leonards Gas Company was held last week, when a dinner was given to a number of prominent burgesses of the town. [p. 262.]

Iron Oxide Production in Cornwall.

A new industry which it is hoped will ultimately provide employment for a considerable number of miners has just been commenced in Cornwall, where a small syndicate has secured concessions and commenced the production of iron oxide for the purification of gas. [p. 260.]

Forthcoming Engagements

May 6.—NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.—Annual Meeting, Newcastle-upon-Tyne.

May 6.—LONDON AND SOUTHERN DISTRICT JUNIOR ASSOCIATION.—Annual Business Meeting.

May 9.—INSTITUTION OF GAS ENGINEERS.—Meetings of Finance Sub-Committee, 2 p.m.; Finance Committee, 2.30 p.m.; Executive Committee, 3 p.m.; 28, Grosvenor Gardens, S.W. 1.

May 10.—INSTITUTION OF GAS ENGINEERS.—Meetings of Council, 9.30 a.m.; Gas Education Executive Committee, 4 p.m.; 28, Grosvenor Gardens, S.W. 1.

May 10.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Board, 28, Grosvenor Gardens, S.W. 1.

May 10.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Board, Hotel Metropole, W.C. 2, 11.30 a.m.; luncheon, 1 p.m.; annual meeting of the Council, 2.15 p.m.; visit to Watson House, 3 p.m.

May 10.—FEDERATION OF GAS EMPLOYERS.—Meeting of Central Committee, Hotel Metropole, W.C. 2, 11.15 a.m.; annual meeting of the Federation, 12.15 p.m.

May 11.—INSTITUTION OF GAS ENGINEERS.—Joint Lighting Committee, 2.15 p.m., 28, Grosvenor Gardens, S.W. 1.

May 11.—BRITISH COMMERCIAL GAS ASSOCIATION.—Meeting of Executive Committee, 2.30 p.m., Grosvenor Gardens, S.W. 1.

May 11.—YORKSHIRE JUNIOR ASSOCIATION.—Visit to Messrs. G. & T. Earle, Ltd., Hope, Derbyshire.

May 14.—SCOTTISH JUNIOR ASSOCIATION (EASTERN DISTRICT).—Annual General Meeting in Edinburgh.

May 17.—INSTITUTION OF GAS ENGINEERS.—Joint Research Committee of the Institution and Leeds University, 10.30 a.m., 28, Grosvenor Gardens, S.W. 1.

May 26.—SOCIETY OF BRITISH GAS INDUSTRIES.—Meeting of Council in the morning, 56, Victoria Street, S.W. 1.

May 26.—SOCIETY OF BRITISH GAS INDUSTRIES.—General Meeting in London.

May 26.—WALES AND MONMOUTHSHIRE ASSOCIATION.—Meeting at Swansea.

June 6.—INSTITUTION OF GAS ENGINEERS.—Meetings of Finance Sub-Committee, 2 p.m.; Finance Committee, 2.30 p.m.; Executive Committee, 3 p.m.; Council, 4 p.m.; 28, Grosvenor Gardens, S.W. 1.

June 7-9.—INSTITUTION OF GAS ENGINEERS.—General Meeting in London.

June 14.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Board, 28, Grosvenor Gardens, S.W. 1.

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Page 76, WITHAM. A. T. Howard appointed Manager *vice* J. Croxall, retired.

Page 116, NOTTINGHAM. E. Howard appointed Public Lighting Superintendent.

Page 62, SOUTHAMPTON. J. R. H. Jacobs, deceased.

EDITORIAL NOTES

History and Development

THERE was a spaciousness of enjoyment, as well as much anxiety, in the early days of the Gas Industry. A comparatively short time ago in the "JOURNAL" we recalled the inauguration ceremony of new chimneys at the works of the Western Gas Company in the 'fifties. The Directors of the Company and their friends celebrated the event by a dinner "served on the top of the shaft, where a platform was erected from which the guests could enjoy the magnificent prospect spread out at their feet, extending to the Surrey Hills and the Grand Stand on Epsom Downs on the one side and to Harrow on the other. A round table provided ample accommodation for all, and the conviviality was kept up till the setting sun gave notice that it was time to descend." There was no question of "therms per ton" in those days—a period of which Mr. P. D. Walmsley speaks in his Presidential Address to the Eastern Counties Gas Managers' Association to-day. His references are to the Great Yarmouth Gas Light and Coke Company, of which he is Engineer and Managing Director, and they are both amusing and human—the foreman who appealed to the Secretary, in 1846, for protection from the violence of his wife; the resolution, passed at the first meeting of the new Company, in 1845, that at all meetings of the directors "the attendance should be punctual, and any one failing when the clock strikes ten should be considered as not present." This resolution, however, failed to intimidate the directors, for in 1847 three out of five directors were "too late." Nor, throughout the history of the Company, have difficulties even more serious resulted in anything but a virile and progressive policy on the part of the directors and management; and Mr. Walmsley's historical notes form a pleasant background to his latest account of two or three particular phases of recent development, as well as indicating that Great Yarmouth was the training ground of at least two men who reached eminence in the gas profession. The recent developments with which the author deals, each calculated to build up the goodwill of the consumer, are gas dehydrating and naphthalene removal, appliance reconditioning, and meter repair and testing.

Only a short time ago dehydrating and naphthalene removal plant by Messrs. Holmes was installed at Great Yarmouth, and the usual story of benefits derived is told. "Always at your service" is now a fact concerning the Company's supply of gas, for stoppages due to water deposition are non-existent, whereas formerly they were a source of expense to the undertaking and annoyance to their consumers. And the same is to be said about naphthalene, which was the cause of more serious trouble. Again, as is usual, Mr. Walmsley cannot set out in terms of £ s. d. the satisfaction derived from an uninterrupted supply of gas, but he gives the cost of treatment as just under a third of a penny per 1000 c.ft., exclusive of the cost of gas oil, which is afterwards used in the carburetted water gas plant. In return for this expenditure there are the minimizing of corrosion in mains and services, and steady improvement in the condition of the meters on the district; and, of course, to offset the cost is the saving of time and money in clearing stoppages and pumping syphons. That Mr. Walmsley is in no two minds about the process will be gathered from the following quotation from his address: "I consider the installation of this plant to be one of the finest investments the Company ever made, as we are now entirely free from stoppages of any kind in mains or services, and our customers have a full and adequate supply of gas at all periods of the day and at all seasons of the year." There is one point, however, that we miss in Mr. Walmsley's sound praise of the process—and that is any reference to the modern combination of gas drying, naphthalene removal, and benzole recovery plant, of the financial advantages of which we have had so much evidence in the course of the past four months.

Regarding load building, Mr. Walmsley confines his remarks to fish frying by gas; and the progress he has made in this direction since 1925 is more than gratifying, especially taking into consideration that competitive interests would not unnaturally concentrate on Yarmouth. When he started his campaign, by designing and making a gas-heated range and offering it at a moderate price either for cash or on hire-purchase terms, he had two customers using gas for fish and potato frying. Now, out of a total of fifty fryers, no fewer than forty are employing gas exclusively, and he has hopes of converting the remaining ten. As for gas sales for the purpose, they increased from 395,000 c.ft. in 1925 to 11,372,000 c.ft. in 1931. Actually the latter figure showed a slight decrease on that for 1930, but taking into account the wretched holiday season and bad fishing season of 1931, the interpretation of the results for that year is one of great encouragement; and Mr. Walmsley has every reason to anticipate a big upward jump in the load when more prosperous conditions obtain. That the load is one to cultivate is obvious from the table of consumptions included in the address.

Unemployment Grants Committee

THE presentation to Parliament of the Report of the Unemployment Grants Committee for the period ended December, 1931, practically terminates the system of Governmental assistance to Unemployment Schemes, as it has been in operation during recent years. The powers given to the Treasury to make grants to Unemployment Schemes terminate on Aug. 31, 1932, on which date the Development (Loan Guarantees and Grants) Act, 1929, expires. This Act was one of the earliest statutes passed by the late Labour Government and was one of the principal measures for dealing with the unemployment question. Industries, including the Gas Industry, were urged collectively and individually by Ministers in general, and Mr. J. H. Thomas in particular, to undertake schemes of work which would provide employment in their areas. Schemes proposed by local authorities were placed under the jurisdiction of the Unemployment Grants Committee, while applications for Governmental assistance by statutory companies were to be referred to the Development Advisory Committee set up by the Treasury for that purpose.

The Gas Industry nobly responded to the call of the Government, and many schemes were formulated by statutory companies as well as by municipal gas departments. The objects of these schemes were various; some related to the extension of mains to outlying areas, others proposed the erection of new gasholders or extensions to the carbonizing plant. All schemes, however, had this in common, that the work involved was not immediately essential to the undertaking, but was put into execution at once in order to create employment and to decrease the number of those dependent for their subsistence upon the dole or other relief. It is not possible upon the figures at present available to estimate the total amount of assistance granted by the Government to the Gas Industry in respect of schemes of this character.

Since 1929 the Unemployment Grants Committee have issued two Reports; the first covers the period from June, 1929, to August, 1930. The Second Report, which has recently been presented to Parliament, deals with the period from August, 1930, up to December, 1931. These Reports naturally only relate to schemes submitted

by local authorities, and it appears that up to August, 1930, unemployment work put in hand by municipal gas departments involved an expenditure of over £750,000. The expenditure involved by work after that date is stated in the Second Report to amount to a sum in excess of £500,000.

It will be seen, therefore, that since the appeal to the Gas Industry by the Government, local authority gas departments have put in hand work involving well over £1,250,000. It is more difficult to estimate the amount of work undertaken by gas companies. Grants to companies are under the supervision of the Development Advisory Committee which has not for a considerable period published figures on the lines of the Reports of the Unemployment Grants Committee. The amount of work undertaken by gas companies, however, undoubtedly exceeds that of gas departments and probably represents an outlay of something in the neighbourhood of £2,000,000. From these figures it is obvious that the Gas Industry has greatly assisted the Government to do everything possible to create employment in the hour of the country's need. Although the power to make grants in aid of such work continues until August next it is unlikely that any assistance can now be obtained in respect of new schemes.

Last August the imperative need for national economy became more fully realized. At that time the Unemployment Grants Committee announced that no new schemes could be considered, and that the amount of assistance which would be granted to schemes then under consideration would be materially reduced. In December, 1931, the Committee found that they had dealt with all the schemes submitted, and decided to adjourn *sine die*. Until some declaration of policy is made by the Government, the work of the Committee may be regarded as virtually at an end. The Development Advisory Committee remains in existence, but it is not anticipated that new schemes submitted would be approved by that Committee for Governmental assistance. It must, of course, be emphasized that schemes which have been approved will be assisted in accordance with the terms originally accepted. Nothing which has occurred subsequently to their approval will in any way affect the amount of assistance which will be given from the Treasury.

Internally Heated Retorts

WHATEVER may be said about the practical significance of Mr. Harald Nielsen's recent paper before the Institution of Chemical Engineers—an extract from which, and a report of the discussion, are published in our issue to-day—he provides plenty of suggestions regarding the development of coal distillation in internally heated retorts, with, of course, particular reference to the 100-ton a day "L. & N." plant erected at Ashby-de-la-Zouch. Of much interest, for example, are those sections of his contribution dealing with the application of the jet condensing principle and the utilization of the latent heat, as well as the sensible heat, of steam as a distilling medium. We take it that the author's process is concerned mainly with the recovery of oils and that at present at any rate the gas is lost and the solid fuel produced is regarded as secondary. And in the course of the discussion the incidence of the revenue derivable from the gas evolved by the coal was emphasized, as also was the quality of the coke, particular attention being called to its ash content.

We do not intend to enter into an argument about the future of low-temperature carbonization in either externally heated or internally heated retorts, but one general point appeals to us in Mr. Nielsen's paper—the reference to the heats of reaction of carbonization. Space forbids reproduction of the thermal balance drawn up by the author, but the conclusion arrived at is that the amount of heat, from all sources, entering the retort, *minus* the ascertainable amount of heat which leaves the retort as sensible and latent heat of the gas and vapours, as well as the sensible heat of the distilled residue, and the thermal losses due to radiation and convection, leaves a *minus* quantity of considerable magnitude. This, says the author, must have been obtained from the exothermic reaction in the coal during the distillation. The exothermic reactions, once they have commenced, are sufficient to raise the coal to such a temperature that the coal becomes active, while the distillation proceeds at an increased rate. The sensible and latent heat entering the retort are practically identical with the sensible and latent heat leaving the retort. The actual heat requirements are only those necessary for drying the coal and heating this dried coal to a temperature at which the exothermic reactions begin. "Up to the present," he concludes, "by the usual externally applied heating method, be it at high or low temperature, it has not been possible to obtain any data on the exothermic or endothermic reactions which could stand the acid test of close scrutiny, but I believe that by internal heat application we have been able to throw some more light on this debatable point, all the more so since the tests have been carried out with hundreds of tons of coal and the margin of error during the observations is reduced to a minimum."

Oxide Purification

IN the "JOURNAL" last week we published a detailed account of the behaviour of oxide of iron used under varying conditions during the past four years for gas purification at the Colne Corporation Gas-Works, this record of careful observations being the subject of a paper by Mr. S. L. Wright to the Manchester and District Junior Gas Association. The record does not disclose anything of a startling nature, but it provides a particular instance confirming the process requirements of oxide purification if the best results are to be obtained, and it will prove a useful guide to the younger technical men in our Industry who are charged with the supervision of gas-works plant. The method of checking and improving the efficiency of the process employed by the author seems to have been mainly one of practical trial and error, and one misses any reference to the laboratory methods of attacking the problem, such as by the simple apparatus described by Mr. D. V. Reid last year and illustrated in the "JOURNAL" for Sept. 23, 1931. Oxides differ greatly in character, as is well known. Each oxide has a best water content or range of water content; the activity of some oxides is confined to a narrow range of water content, while the activity of others may continue almost constant over a wide range; and each oxide has an optimum temperature for sulphuretted hydrogen removal. For ascertaining the water contents and temperature likely to yield optimum results the apparatus referred to has proved most valuable, and it can be applied to the testing of mixtures of partially spent and new oxides. The use of some such apparatus might, perhaps, have saved Mr. Wright considerable labour costs.

All the practical results quoted by the author follow almost automatically from the conclusions drawn by Mr. W. A. Dunkley and his co-workers in America, whose classic investigations have been dealt with from time to time in the "JOURNAL." The effect of fineness of division of the oxide is in some measure brought out by Mr. Wright, as also is the influence of water content. In some works even to-day it is not uncommon to wet an oxide "thoroughly" before putting it into a purifier, and then to forget all about its moisture content when the material is doing its work. Steam admission and temperature conditions must be adjusted to maintain a definite range of water content of the oxide until it is due for revivification. Mr. Wright draws several conclusions from his observation of the Colne purifiers, and one of these—"it pays to test oxides for moisture and sulphur before they are actually required for use in a box, and to prepare them accordingly"—might, we suggest, be modified to advantage, in the light of the foregoing, to "it pays to determine in the laboratory the activity and capacity of oxides or mixtures of oxides at different temperatures and moisture contents, and, having arrived at the ranges which yield the best results, endeavour to maintain them in practice."

To our mind Mr. Wright's paper is admirable in that it gives a picture of what occurs during different seasons of the year, and under different conditions of gas flow, in a set of gas purifiers such as that installed at the Colne

Gas-Works. The advantages and disadvantages of downward and upward flow are set out, and remedies of the disadvantages are advanced. The author found that, with downward flow, winter top layers of oxide lost their activity through excessive moisture content, due to condensation; and when the gas was warmed by a steam-heated jacket, loss of activity of the bottom layers of oxide ensued due to absorption of moisture from the oxide by the warm gas. Mr. Wright, it seems, did not try a live steam *plus* external heat compromise, but reverted to upward flow of gas. Taking the paper as a whole, however, the experience of the author may clear up many points which have proved perplexing to those entrusted with the task of working the oxide purification process economically. Certainly it is indicative of the new school of thought regarding gas manufacture.

PERSONAL

A WELL-KNOWN ENGINEER—DIRECTOR—NOVELIST.

A new book by Francis Everton is an event of interest to our readers, since Francis Everton is the pen name hiding the personality of Mr. F. W. Stokes, who has been largely responsible for the development of a special process for making castings under centrifugal pressure. He is the Managing-Director of the Sheepbridge Stokes Centrifugal Castings Company, Ltd., engaged in working the process, is also Managing-Director of Stokes Castings, Ltd., Mansfield, and a Director of Kirkham, Hulett, & Chandler, Ltd., Gas Engineers, of London, and Sheepbridge Stokes Engine Liners, Ltd. His home is at Mansfield.

Born in 1883, Mr. Stokes was educated at Queen Elizabeth's Grammar School, and later at the University College

Francis Everton (in real life F. W. Stokes), author of "The Young Vanish," just published.*

at Nottingham, where he took the Honours Degree of B.Sc. in Engineering, London University. He is an Associate Member of the Institute of Engineers, a member of the Iron and Steel Institute, and other Engineering Societies.

Mr. Stokes' first book was "The Dalehouse Murder," since when he has written two other novels, "Murder at Plenders" and "The Hammer of Doom," both of which achieved remarkable success. His new book, "The Young Vanish," written on the train and during his spare evenings at home, is being published by the Crime Club as the "Selected Book" for May. There is a strong engineering flavour in it, and the Sheepbridge Stokes Centrifugal Castings Company is actually mentioned in the book. The nitrarding process referred to in the book is actually in use to-day, and the piece of detection done from engine liners is definitely possible.

At a meeting of the Birmingham Gas Committee on Monday last week a testimonial, in book form, beautifully illuminated, was presented to Mr. R. J. Rogers, Fittings Superintendent of the Department, who has resigned to take up the position of Managing Director of the Parkinson Stove Company, expressing high appreciation of his services. The presentation was made by the Lord Mayor (Alderman J. B. Burman), who alluded to the efficiency of Mr. Rogers' work and to the public-spirited way in which he had worked on behalf of social and recreative movements, for the development of the Departmental magazine, and in furtherance of the Gas Section at the British Industries Fair. His loyalty, initiative, enthusiasm, and his social qualities were commented upon by the Lord Mayor and Alderman J. H. Lloyd, the Chairman of the Gas Committee.

The marriage took place at Hampstead Parish Church, on April 26, of John F. West, elder son of Mr. and Mrs. F. J. West, of Winslow, Cheshire, and Elsie Doris, elder daughter of Mr. and Mrs. T. Hardie, of West Heath Avenue, N.W. 11.

Mr. L. Shipman, of Sheffield, who represented a well-known firm of Lighting Engineers, has joined the staff of Messrs. David Grant & Co., Gas Meter Manufacturers, of Edinburgh, as from May 2, to represent them in the northern districts of England.

Mr. W. J. Baker, Engineer-in-Chief to the Shanghai Gas Company, arrived in England on April 27 for a six months' stay to complete arrangements for the purchase of new plant. The Company is erecting a complete new 4 million c.ft. per day plant on a new site—the installation to embody Woodall-Duckham continuous vertical retorts.

Owing to mourning, no special invitations were issued; but this did not prevent many friends from going to All Saints' Church, Santos, on Tuesday, March 29, to witness the wedding of Mr. Henry Thomas William Pilbeam to Miss Lillian Dorothea Browne, daughter of Mr. and Mrs. Bernard F. Browne, who have done so much for the City of Santos.

OBITUARY

THE LATE MR. J. R. H. JACOBS.

A Service in memory of the late Mr. J. R. H. Jacobs will be held at All Saints' Church, High Street, Southampton, on Tuesday, May 10, at 2.30 p.m. The many friends of Mr. Jacobs are invited to attend the Service, which will be conducted by the Rector, the Rev. J. Blennerhassett West, B.A. The funeral, which will be quite private, and will be attended only by relatives, will take place at the same time.

The death took place on April 24 of Mr. George Baines, in his 76th year. Mr. Baines, a native of Alne, Yorks., went to Harwich at the age of 21 years, and for the past half-century he had been engaged in public works in the borough. Upon his arrival in the Essex seaport, he became associated with the late Mr. E. Chapman, who was for many years Town Clerk of Harwich. The late Mr. Baines undertook the magisterial side of the work, with Mr. F. J. Mantle being responsible for the County Court branch. Mr. Baines also assisted Mr. Chapman, who was then Secreto the Harwich Gas and Coke Company, and upon his death, in January, 1904, Mr. Baines became Secretary of the Gas Company, a position he held until 1920, when, in consideration of his faithful and conscientious service to the Company, he was appointed a Director, a position he held up to the time of his death. It was only at the recent annual meeting in February that the late Mr. Baines was reappointed Director, after the Chairman (Mr. H. J. W. Jervis) had eulogized the service of Mr. Baines to the Company.

* By W. Collins Sons & Co., Ltd.; price, 7s 6d.

THE NEWS OF THE WEEK

The Production of Broken Coke has been started at West Stanley, Durham, by the Stanley and District Gas Company. Special plant has been installed.

The Halifax Gas Committee are seeking sanction for extension and alteration of equipment at the gas-works, mainly to the setting of vertical retorts. The scheme is to do the work by direct labour, and the cost is estimated at £5000.

Scottish Gas Utilities Corporation has been registered as a private Company, with a capital of £10,000 in £1 shares, to operate plants for treating coal and other carbonaceous materials for the extraction of oil and other constituents. Registered office: 5, Suffolk Street, Pall Mall, S.W. 1.

A Series of Cooking Lectures and demonstrations was given at Minehead last week by Miss G. Richardson, of Richmonds Gas Stove Company, Ltd., member of Radiation Ltd. The lectures were attended by record numbers and were enthusiastically received. Good business has been done as a result.

According to the Gas Examiner's Report for the past quarter the calorific value of gas supplied by the Edinburgh Corporation Gas Department throughout the area of the city and suburbs was 500·4 B.Th.U. per c.ft. It was free from impurity, and the pressure tests throughout the area were also satisfactory. The declared calorific value is 500 B.Th.U. per c.ft.

Seventy-Four Applications were considered by the Port Talbot Corporation on Friday for the position of Gas Manager in succession to the late Mr. A. J. Bond, and they were ultimately reduced to a short list of six, who will be asked to appear before a special meeting of the Council. The commencing salary is £500 a year with free house and lighting.

The Guildford Gas Light and Coke Company have intimated to the Corporation Housing Committee that they are willing to supply, fix, and maintain gas coppers in the Council's houses free of charge—the coppers to remain the property of the Company. The Committee recommended that no objection be raised to the fixing of such gas coppers in cases where the existing fuel coppers are worn out and the tenant desires a gas copper.

The Stockton-on-Tees Corporation have obtained sanction to proceed with the reconstruction of the retort house at the Corporation Gas-Works, and are inviting tenders. The extensions will consist of steel framing and steel roof with brickwork, panelling, &c., and there will be bench bracing and stage flooring, eight arches, furnaces, and retorts, and new coal plant and coke handling plant, and also alterations to the telpher track. The cost is estimated at £50,000.

A Competition was arranged by the Bristol Gas Company in connection with the Bristol Shopping Festival during the period April 21 to 30. This competition invited the public to estimate the number of cubic feet of gas used in Bristol for the week ended April 30, and entitled competitors to an opportunity to win the prize offered by the trader who issued the entry form, and also of winning one of the central prizes. Comparative figures showed the amount of gas used in the corresponding weeks in each year since 1927.

The Heating of a Great Exhibition.—Following closely on the very satisfactory heating this year of the Textiles Section of the British Industries Fair at the White City—always a difficult problem for the heating engineer—the latest issue (No. 217) of "A Thousand-and-One Uses for Gas," contains many fine photographs of the interiors of the halls which housed the Fair. The illustrations show details of the gas heating systems adopted. A point well brought out in this book is the ease with which the heat was varied from day to day in accordance with climatic conditions.

A Maintenance Scheme was suggested to the Chorley Corporation Gas Committee by the Gas Engineer, whereby specially trained men would visit consumers' dwellings to ensure that all fittings and appliances are in a condition to give a satisfactory supply. For this service there would be no charge except for materials used. It is anticipated that such a scheme would have beneficial results and would relieve the work of the fitting staff. At the outset the Gas Engineer proposes that two men be employed and trained for the work, and uniforms provided. The Committee decided to inaugurate the maintenance scheme.

The Midland Association will hold their Spring Meeting at Birmingham on Thursday, May 12, at 11 a.m., when members will assemble at the Nechells Gas-Works for an inspection of these works, and also the Chemical Laboratories and Saltley Works. Luncheon will be provided at the Devon Street Recreation Rooms by the kind invitation of the Birmingham Gas Department. After lunch a visit will be made to the Industrial Research Laboratories, Meter and Stove Shops, and the Heat Treatment Foundry, and should any members desire to inspect the recently installed deep purifiers at Windsor Street, arrangements will be made for them to do so. Tea will be served in the Windsor Street Messroom.

The Chorley Gas Committee have had a report from the Gas Engineer in regard to the existing hire-purchase scheme for gas appliances, drawing attention to the fact that, owing to trade depression, a number of consumers are in arrears with their payments. It is felt that the period for the payment of appliances might be extended so as to reduce the quarterly payments both in respect to existing and future agreements. It was suggested that the maximum period for cookers, geysers, and gas fires be extended from six to nine years and for gas wash-boilers from three to four years. It is not proposed that any alteration be made in the period of payment for the supply of gas irons, which would remain at two years. These recommendations were approved.

A New Gasholder, which cost £2500, was formally inaugurated at Laurencekirk last week by Mrs. Adams, wife of the Chairman of Laurencekirk Lighting Society. Mr. Adams presided over a large company at the works, and during the course of a few remarks said that it had been said that the Company was foolish to embark on the expenditure when there was a prospect of electricity being introduced, but it was imperative that the Gas Industry be preserved. The gasholder was a necessity, since they had no reserve storage space, and had a breakdown taken place there would have been no gas in the town. The company present included Mr. W. L. Burns, Managing Director of Messrs. H. Brown & Co., Ltd., Gas Engineers, Leven, who were the contractors, Mr. J. Scobie, Manager of the Stonehaven Gas-Works, the Directors of the local Gas Company, and a number of local public men.

Ulverston Gas-Works.—At the annual meeting of the Ulverston Urban District Council on Tuesday, April 26, the Gas and Water Committee reported that the estimated profit for the year on Gas-Works account would amount to £300, and it was proposed to transfer this to district fund account for the relief of the rates. This was agreed to, although, during the discussion, there was a suggestion that users should have the benefit of it. £300 was a smaller sum than in preceding years, but there had been two heavy items of expenditure in relaying a main at a cost of £412 and in rebuilding the gas-works wall, £475, and had it not been for these items the profit would have been £1100. In regard to the coming year, he was rather afraid the gas-works would not be able to show as good a profit as in the past 12 months. They had two beds of retorts to renew, and they were also anxious to relay, if not the whole, at least a portion of the main to Swarthmoor.

THE NEWS—continued.

Coke Oven Gas for Industrial Purposes.

By arrangement between the Rotherham Corporation Gas and Education Committees, a series of three lectures on the use of coke oven gas for industrial purposes was arranged to take place in the Assembly Hall of the Rotherham Technical College.

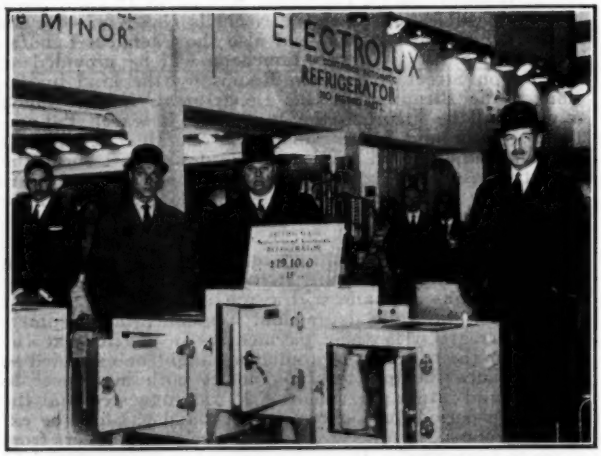
The first of these lectures was given on April 27 by Mr. H. R. Hems, of the Industrial Heating Section of the City of Birmingham Gas Department. Mr. Hems' talk was on "The Application of Town Gas to Industrial Heating Processes." Mr. A. Blenkinsop, J.P., presided.

The subject of the second lecture, which is to be given to-day by Mr. F. L. Atkin (also of the Industrial Heating Section of the Birmingham Gas Department), is "The Construction, Repair, and Maintenance of Gas-Heated Furnaces and Appliances." Prof. Douglas Hay will preside.

The last of the series will be given on May 11 by Dr. C. M. Walter (Engineer-in-Charge of the Industrial Research Laboratories of the Birmingham Gas Department). The subject will be "Gas Furnaces—Theoretical Considerations." Lieut.-Col. H. Rhodes will preside.

Admission to the lectures is free.

The Prince of Wales at Olympia.



This photograph shows H.R.H. The Prince of Wales, Lord Rothermere, and Sir Harold Wernher (Chairman of Messrs. Electrolux, Ltd.) on the Electrolux stand at the "Daily Mail" Ideal Home Exhibition, Olympia. The Prince showed particular interest in the "Electrolux" silent automatic refrigerators. For these a big future is prophesied, for the day is not far off when a refrigerator will be the standard equipment in practically every home. His Royal Highness was intrigued with the latest type of refrigerator—the "Electrolux Minor."

Nottingham's Annexation Proposals and Gas Supplies.

After proceedings extending over a fortnight, before a Select Committee of the House of Commons, the Nottingham Corporation experienced a severe rebuff on Wednesday last, in reference to its application for a considerable extension of the city boundaries involving the inclusion within the municipal area of several populous suburban townships and smaller rural parishes which are dependent upon the Corporation's resources for their gas, electricity, and water supplies. The main objectors to the scheme, as upon the occasion of a former unsuccessful promotion of a similar private Parliamentary measure, was the Notts. County Council, whose administrative area had been threatened to be despoiled of some of its chief rateable territories, and the local authorities of West Bridgford, Carlton, and Beeston. The first named is the largest suburban residential area, which has become thickly inhabited within recent years, and is in the immediate neighbourhood of the city from which it is divided by the River Trent.

While all the places which were sought to be annexed by the Bill are dependent upon the city for their gas supplies, which they obtain upon a differential basis, they were unanimous in support of the County Council's and Urban District Councils' opposition to the measure, the argument being advanced that recent disclosures in connection with the City's Gas Undertaking disentitled the Corporation, upon the score of its lack of efficient administration, to any consideration in relation to municipal extension. That contention, however, was effectively disposed of by the reference which was made by Mr. Tyldesley Jones, K.C., leading Counsel for the Corporation, to an analogous case, in which, upon the occasion of the promotion of a similar Annexation Bill by the Wolverhampton Corporation, it was unsuccessfully attempted to establish that they were not entitled to consideration by reason of certain monetary irregularities which had been committed in the Education Department of that borough.

After exhaustive investigations the proceedings came to a temporary suspension by the announcement of the Chairman of the Committee (Mr. Somerville, M.P. for the Windsor Division) that they had decided not to accede to the Corporation's application in so far as it related to any extension of the municipal boundary southwards. This means that the Corporation's principal contemplated asset in West Bridgford has been excluded from the Bill, together with Edwalton and Gamston, which also lie on the south side of the Trent. As to the other places enumerated in the Bill, the Committee's further deliberations were adjourned until yesterday.

Complete Gasification.

In the course of an address to the Coal Trade Luncheon Club, Dr. A. E. Dunstan, Chief Chemist of the Anglo-Persian Oil Company, said:

My considered opinion is that the solution of your difficulties will be in the complete gasification of that coal which is not directly burned for power production. I am authorized by Sir John Cadman to point out that this question of gasification of coal is, in his opinion, a matter of great national interest. He feels that the Gas Industry, restricted as it is by close specifications imposed by Parliament, is unfairly handicapped in its endeavour to produce a convenient, economical, and effective fuel. The apparent difficulties of transmitting what may be called "power gas"—*i.e.*, gas not nearly so well refined as "town gas"—through a high pressure distribution system, he thinks, will yield to closer investigation.

The gas era will be dependent upon the combination of the gas and coke oven industries, by which there will result a network of high-pressure gas mains over the country and the pooling and carbonization of all suitable coal. The exact temperature best suited to various grades of coal will thus be applied, and this is where low-temperature carbonization may find a local use. Metallurgic and household coke will then be produced in proportions that neither clash nor cause shortages, and gases of various calorific values will be made as required either for immediate use or transmission to a distance.

Production of Iron Oxide in Cornwall.

A new industry which it is hoped will ultimately provide employment for a considerable number of miners has just been commenced in Cornwall, where a small syndicate styling itself British Iron Oxide, Ltd., has secured concessions and commenced the production of iron oxide for the purification of gas. The works are being managed by one of the members of the firm, Mr. Percy Bond, who has had experience of ore mining in various parts of the world.

In the course of an interview Mr. Bond said: "Cornish oxide has been known for years, but it has been used more or less in its rough state and not hitherto as a prepared oxide. We have gone into the question very thoroughly, and after six months of serious tests of bulk samples, &c., we have arrived at the conclusion that the Cornish oxide is superior to that of the ores of other lands, and this is supported by practical tests by gas engineers. It has been found superior in active iron—a vital factor in gas purification—to any of the Belgian, Dutch, or other ores, and even to a German synthetic compound which is being imported into this country and which is mixed with some inferior ores to create activity. The Cornish ores alone are very active. We have now commenced operations. We have been operating very quietly for three months in the Godolphin Valley at Leedstown. This valley is an extensive one of about five miles, and a series of adits from the once famous Great Work Mine is discharging oxide into the valley. A considerable tonnage of very rich oxide has been deposited, and we have now commenced removing this, and drying and treating it for the market as a prepared oxide. A dozen men are at present employed, and if support is forthcoming—so far there is every indication that this support will be favourable—then during the sum-

mer it will certainly mean that we shall be employing not less than one hundred. Machinery has been installed for preparing the oxide, but it is very largely a hand labour proposition. The valley really contains an enormous reserve of oxide. In the Portreath and Nancekuke districts concessions have been taken over and operations commenced there. At the moment negotiations are in progress for acquiring a section of the well-known Carnon Valley oxide deposits."

National Association of Trade Protection Societies.

Sir Francis Goodenough is to be elected Vice-President of the National Association of Trade Protection Societies, of which Lord Meston is President.

At the banquet following the annual conference on May 10 the chief speakers will include Lord Meston, Viscount Elibank, Sir Francis Goodenough, and Mr. Charles E. Gorham (Managing Director, Bankers' Commercial Security).

An Exhibition of I.C.I. Products.

An Exhibition was opened on Monday last by Imperial Chemical Industries, Ltd., at Thames House, Millbank, S.W. 1, of the firm's products of interest to architects, builders, contractors, and others connected with the constructional trades. This has been organized in conjunction with the R.I.B.A. exhibition of competition drawings in Thames House. The items shown at the exhibition are mainly those which may be defined as new products developed through the research organization of Imperial Chemical Industries, Ltd. Coincident with the trend of modern architecture grows the need for suitable products to meet the requirements of new decorative schemes, new methods of construction, and the general speeding up of building work generally. To meet this demand Imperial Chemical Industries, Ltd., through their subsidiary and associated companies, are inviting the attention of architects to the following products: Non-ferrous metals; wall coverings and leather cloth; flexside; plastics; paints, enamels, and varnishes; partition blocks and plaster; "Limbux" hydrated lime; lighting fixtures; tube and sphere construction for light steel structures; and welded products.

Lighting Section.

The lighting section, arranged in co-operation with Messrs. Lighting Trades, Ltd., of 30/31, Farringdon Street, E.C. 4, contains a number of attractive fittings, most of them as applicable to gas lighting as to electric, and illustrating the modern tendency towards the elimination of metal and the greater use of glass in various shapes. At the same time there is still a large demand for period fittings such as are also included in the display. In this section there is in addition an example of a modern portable gas fire—the "Kernscreen"—in a pleasing metal finish with doors to close over the actual heating unit when not in use. This fire is inclined slightly backwards with the radiants some 6 in. above the floor level, thus throwing the maximum amount of heat outwards and upwards into the room.

The tube and sphere construction section is of interest to the Gas Industry, showing a new patented system for the construction of cheaper light steel structures. Welding already offers cheaper costs using the usual rolled steel sections, but the I.C.I. tube and sphere construction exploits for the first time the full possibilities of the welding method and uses tubular sections which are ideal for many types of structures. A model of a modern pipe-line gantry, illustrating how, for example, a gas main may be carried across a river or cutting, is of interest.

Considerable attention is devoted to arc welding, which is making great strides in the structural field, and it is shown by models and photographs how the process is applied also in the manufacture of articles for the interior of buildings, such as domestic boilers, hot water tanks, steel window frames, steam pipes, steel furniture, and in the fabrication of all kinds of metals, ferrous and non-ferrous. Iron gates and other ornamental ironwork can also be constructed by this process.

A wide variety of other exhibits includes insulating materials and accessories, embracing "Tufnol" (made by Ellison Insulations, Ltd., of Birmingham), which has many other uses than for electrical applications. It can be used, in fact, wherever a material is required to withstand weather, water, oils, solvents, chemical solutions, mechanical stress, and temperatures up to 300° Fahr.

The exhibition as a whole is extremely interesting and well repays a visit.

THE NEWS—continued.

Tar Propaganda.

Negotiations have been completed for the public exhibition of the British Road Tar Association's short version talking film "Tar" at 300 cinemas throughout the country. The following is the first list of bookings—three days' showing at each theatre:

May 9.
The Palace, Kilburn.
The Palace, Wandsworth.
The Coronet, Notting Hill Gate.
The Picturedrome, Crouch End.

May 12.
Cinema, Stamford Hill.
Hipprodrome, Putney.
Annexe, Islington.
Cinema, Hoxton.
Globe, Old Kent Road.

May 16.
Empire, Holloway.
Cinema, Canning Town.
Rialto, Liverpool.

May 19.
Theatre, Kennington.
Annexe, Peckham.
Queen's, Rushey Green.
Smart's, Bethnal Green.
Hippodrome, Camden Town.
Regent, Ipswich.
Haymarket, Norwich.

May 23.
P.C.T., Preston.
Havelock, Sunderland.
Queen's, Newcastle.

May 26.
P.C.T., Southport.
P.C.T., Chester.
P.C.T., Gateshead.

May 30.
Gaumont Palace, Middlesbrough.

June 6.
P.C.T., Exeter.
P.C.T., Bridgwater.
P.C.T., Yeovil.
P.C.T., Byker.
Court, Darlington.

June 13.
Plaza, Liverpool.
P.C.T., Leigh.
P.C.T., Whitley Bay.

Education for Commerce.

In the course of the debate on the Education Estimates in the House of Commons on April 18, Mr. H. Ramsbotham, Parliamentary Secretary to the Board of Education, said: We must break down the barriers which now exist and have existed for generations between the schools and industry and commerce. The Committee on Salesmanship was presided over by Sir Francis Goodenough, a most able Chairman, and it presented a most able report in which specific attention was drawn to the question of recruitment. They pointed out that business leaders, and the same applies to industrial leaders, should insist on the most careful recruitment from school for their concerns, and the Committee found, in effect, that a substantial number of firms in this country know little either of the schools from which their recruits come or of the work done in those schools. I think it comes to this, that many firms are still using pre-war recruiting methods, the methods which were in vogue thirty years ago, regardless of the immense advance which has taken place in our education. Before the war the majority of the recruits to industry and commerce were drawn from the public elementary schools and the school leavers of 13 or 14 years of age. There was no other source, because the secondary school population was very small.

The position to-day has immensely altered. For every boy and girl in the secondary schools in the decade from 1900 to 1910 there are four to-day. The secondary school population has increased fourfold. It is obvious that if the policy of recruiting from the public elementary schools is continued, a large number of the most able boys and girls will be missed, for the simple reason that at the age of eleven they have been drifted from the public elementary schools to the secondary schools, and in certain cases to the central schools, on the ground of merit and ability. That is a fundamental point which employers throughout the land might consider. I suggest that this report should be carefully studied by all employers throughout the country. We are taking steps to do our best to give it all the publicity possible, with the help of Sir Francis Goodenough, the Chairman. Conferences have been arranged and are taking place, the co-operation of the Association of Chambers of Commerce has been obtained, and a questionnaire is now practically on its way to all Chambers of Commerce in the country, asking for their assistance and for information.

There is another point raised by this report to which I will draw attention. It affects the question of part-time release for further education and technical education, and in the day-time. With regard to school leavers between 14 and 16, there are rather over 200,000 getting further education for themselves in the evening classes; and of those who are older, from 16 to about 21, there are something like 750,000. That is to say, nearly a million boys and girls in this country are educating themselves in evening classes, and, in the vast majority of cases, when their day's work is over and they have had a full day's work in a factory or in a shop. All honour to them; and the nation that can produce figures like that can be proud of itself. At the same time, it is a wasteful process, it is a weeding-out process, and sometimes a ruthless process,

THE NEWS—continued.

and many good ones must fall by the way who are not capable of the strain of attending evening classes for a year or for two years or more, and doing their day's work at the same time.

In the old days before the war, the theory was that it did not matter what you taught a boy so long as he disliked it. To-day we have changed that. By part-time release, so that *pari passu* with his work and livelihood a boy can have one or more days to learn in school the why and wherefore of his work, he is given a purposefulness in his learning which otherwise it would be difficult to impart. The State is now taking the place of the employer in the training of the apprentices. It is increasingly difficult to train apprentices; works are so large and complex that employers cannot do it. That leads me to the question of junior technical schools, which definitely take the part of the training of apprentices. We should probably concentrate still more on making them definitely trade schools such as the printing school in London. In any event, it is satisfactory to note that they are on the increase.

As regards technical training generally and the progress since the war, there again there is a large and gratifying increase in the number of students. But technical training must be based on a sound general education. Otherwise we shall find ourselves in the same difficulty as the old mechanics' institutes, which had to adopt a system of continuation schools in order to fit boys and girls for technical training.

Gas Progress in Coventry.

The Coventry Municipal Handbook for 1932, which has just been issued, states that in 1884, when the gas undertaking was acquired by the Corporation from a company which had been established in 1820, the gas sold was approximately 174 million c.ft. Last year the gas sold was 2284 million c.ft.

A table of statistics, which deals with the years from 1922 to 1931, shows that the undertaking has, with the exception of 1928, when there was a loss, made handsome profits during the past decade. The amount of coal carbonized is 146,000 tons, and about 1600 tons of oil are used in the manufacture of water gas. There are approximately 300 miles of gas mains in the area of supply. On March 31, 1931, there were 50,792 consumers, of whom 38,791 were prepayment consumers. At the same date 40,340 cooking stoves were out on hire.

Welding *v.* Riveting.

At an informal meeting of the Institution of Civil Engineers on April 20, a discussion took place on welded construction in comparison with riveted construction. The subject was introduced by Mr. F. R. Freeman, who referred to the growing adoption of electric welding in place of riveting, and to the various bodies, including the Board of Industrial Research, which were considering the problems involved, and which were attempting to draw up a code of practice.

The advantages of the method were stated to be economy, improved construction, convenience, avoidance of noise during erection, and appearance. The disadvantages were unfamiliar construction, lack of complete test data, heat contraction stresses, lack of experienced welders, and lack of standardized practice in design and materials; but, in the introducer's opinion, these would all be overcome as greater experience was obtained. Lantern slides were shown, indicating the progress that was being made, both at home and abroad.

Centenary of the Hastings and St. Leonards Gas Company.

The second gathering in connection with the celebration of the Centenary of the Hastings and St. Leonards Gas Company was held on Tuesday evening, April 26, at the Queen's Hotel, Hastings, when a dinner was given to a number of prominent burgesses of the town who are interested in the history and progress of the Company. The Chairman of the Company, Mr. A. M. Apel, presided, supported by most of the Directors, and by the Engineer and General Manager, Mr. Charles F. Botley, M.Inst.C.E.

The Mayor of Hastings (Councillor G. H. Ormerod, J.P.) and the Mayoress were the principal guests.

The speeches at the dinner contained reminiscences of Hastings at the period of the foundation of the Company in the year 1832. Mr. Botley led off in his proposal of the toast of "The Guests." He referred with pride and gratification to the progress his Company had continued to make since the undertaking was purchased from the then proprietor. The acceptances to the invitation of that evening proved that the Company was in good repute. Of those who had help to build up the undertaking's present prosperous condition he mentioned the names of the late Mr. Wood; Mr. Piper, an accomplished accountant; and the late esteemed Dr. Gray.

Followed the response by Mr. Percy Idle, who was formerly Town Clerk of the Borough. He praised the work of the Company, especially the part which the present Engineer and General Manager, and his father, the late Mr. Chas. E. Botley, had taken in establishing its fortune, covering together a period of 45 years.

The toast of the evening, "The Hastings and St. Leonards Gas Company," was entrusted to the Mayor, who spoke of the importance of the Gas Industry in the economic life and well-being of the nation. The business men of Hastings had shown great courage in 1832 in starting the Company whose centenary they were that evening met to celebrate.

The Chairman of the Company, replying, mentioned that in the year of the formation of the Company the output was 2½ million c.ft.; in 1851 it had increased to 9 millions; in 1881 to 179 millions; and last year the figure was 602 millions. For this satisfactory advance the present Engineer and his father undoubtedly should receive acknowledgment.

National Physical Laboratory.

Refractory Materials.

In the Report of the National Physical Laboratory for the year 1931 reference is made to metallurgical researches involving the use of high temperatures and calling for a higher degree of purity, making stringent demands on the crucibles, muffles, and other apparatus employed in the melting and treatment of metals and alloys. The refractory materials from which these articles are made must not only withstand very high temperatures, but must resist severe corrosive and other harmful influences.

During the course of researches at the Laboratory it was found that these requirements could not be met by materials available from commercial sources. A study was therefore undertaken of the properties of various refractory materials and of their production in the form of suitable apparatus. A number of these investigations are mentioned in the Report, and an important paper summarizing the results so far obtained has been published. The results of this work, which has been essential to a large number of researches, are likely to find widespread application, not only in the limited sphere of metallurgical research, but also in industrial practice, where the modern trend towards the production of specialized metals and alloys of high purity demands a supply of refractory materials possessing exceptional properties.

Advertising on Street Lamp Standards.

The Lighting Committee of the St. Pancras Borough Council report that in January, 1930, they approved the principle of utilizing public street lamp standards for advertising purposes, subject to certain conditions. Further consideration of the details of the matter was deferred in consequence of a request from the Ministry of Transport, which desired to consider as to formulating general principles for the regulation of such signs in London.

The question has been considered by the London and Home Counties Traffic Advisory Committee and the Metropolitan Boroughs' Standing Joint Committee, and both authorities regard the erection of signs upon the public highway having merely or mainly a commercial or advertising value as undesirable. In a communication received from the Ministry of Transport, it was pointed out that, while the Minister had not yet reached a conclusion as to the steps to be taken to deal with the general question of signs upon the public highway, he would deprecate any permission being given by highway authorities to erect signs upon standards or lamp-posts on the public highway for the purpose of advertisement, and in these circumstances he hoped that the Council would see their way not to proceed with the original proposal.

The Committee point out, however, that similar advertising signs are placed in four adjoining boroughs, and as the revenue derivable from such advertisements would lessen the cost to the Council of public lighting, which amounts to approximately £24,000 per annum, they are of opinion that the Council should now proceed with the proposal.

ROTHERHAM'S LATEST ENTERPRISE

Inauguration of New Showrooms, Offices, and Extended Workshops

INTERIOR VIEWS OF ROTHERHAM'S NEW GAS SHOWROOMS.

Gas was first manufactured in Rotherham in 1833 by a private company, from whom the Local Board purchased the Undertaking in 1870 for £53,455. Since that date considerable expansion has taken place involving capital expenditure which had reached the sum of £328,834 in 1931, leaving a net debt of £127,954.

In 1918 the Corporation secured Parliamentary powers to purchase and distribute coke oven gas, and supplies have since been taken in increasing quantities.

It was decided in 1928 to close down the Corporation's gas-making plant and to meet the whole of the town's requirements with purified coke oven gas. As a stand-by in case of emergency a carburetted water gas plant was installed.

During recent years there has been a rapidly increasing demand for supplies of crude gas for industrial purposes, particularly for furnace heating. The following table shows the remarkable progress of the Gas Undertaking during the past few years:

Year Ended March 31.	Purified Gas Sold.	Crude Gas Sold.	Total.	Increases.
	Million C.Ft.	Million C.Ft.		P.Ct.
1927	338	..	338	..
1928	376	..	376	11·2
1929	383	122	505	34·4
1930	427	201	628	24·4
1931	527	168	695	10·7
1932	550 (approx.)	212 (approx.)	762 (approx.)	9·6

The declared calorific value of the purified gas sold is 500 B.Th.U.

The prices charged are based on 3s. per 1000 c.ft. for domestic purposes and for industrial uses there is a sliding scale down to 1s. per 1000 c.ft. For very large consumptions the charges are as low as 1½d. per therm for crude gas and 2d. per therm for purified town gas. The proportion of gas sold for industrial purposes in 1931 was 42 p.ct. of the total sales.

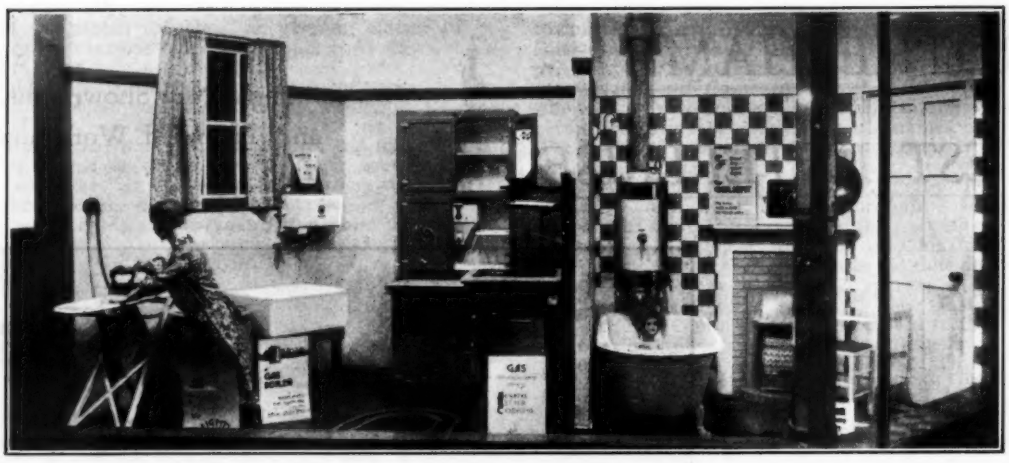
The Department now serves an area of 30 sq. miles, which embraces in addition to the whole of the County Borough, the townships of Brinsworth, Whiston, Dalton, Aldwarke, Greasborough, part of Ecclesfield, Thrybergh, Catcliffe, Treeton, Wickersley, and a portion of Wentworth. The public lighting of practically the whole of this area is also supplied by the Gas Department. The total population served exceeds 100,000.

For several years the lack of adequate workshop accommodation in the Department has seriously hampered the repair work on gas meters, cookers, street lamps, and other appliances. In 1930 it was felt that with the extending services of the Undertaking, improved repair facilities were essential in order to produce a speedier and more satisfactory output. In support of the efforts of the Improvement and Property Committee to re-construct the corner adjoining Chantry Bridge, it was decided to erect a new Gas Showroom, administrative offices, workshops, and a properly equipped stores.

Following the completion of the new premises the old workshops and stores were converted into shops, which not only improve the appearance of this end of Frederick Street but will provide revenue for the Department.

The new buildings, which have a total frontage of 110 ft. and a depth of 140 ft. along the River Don, have been designed and planned to meet the special needs of the Gas Department by the Gas Engineer with the Borough Engineer, who has supervised the erection of the premises.

Natural stone from the Whatstandwell Quarries, near Matlock, has been used for the main elevations, which have been designed in harmony with the immediate surround-



The photograph of this window display in the new showrooms of the Rotherham Gas Department was taken at night—the sole illumination being the hidden gas lamps with directional reflectors, which constitute the normal lighting of the windows.

ings. The buildings have been erected on the steel frame principle and reinforced concrete.

Showroom accommodation has been provided on the ground floor, having a total area of 2640 sq. ft. with general offices over, consisting of 3200 sq. ft.

The ground floor portion of the workshops consist of 5920 sq. ft. and is utilized as stores, gas cooker repair workshops, and mess room. The first floor of 4000 sq. ft. provides accommodation for meter repairs, testing, and foreman's office.

The buildings are heated throughout by a low-pressure hot water system and gas-fired boiler. Gas is also used for artificial lighting.

The cost of the entire scheme, including equipment, amounts to just under £25,000, towards which the Unemployment Grants Committee have made a substantial contribution.

The Opening Ceremony was performed at the works of the Rotherham Corporation Gas Department on April 16 by the Mayor of Rotherham (Alderman G. E. Caine), in the presence of a large assembly of leaders in various spheres of local life, visiting gas engineers from several Yorkshire areas, and also the members of the Yorkshire Junior Gas Association, who were meeting at Rotherham that day to hear the Presidential Address of Mr. J. W. Holroyd (Chief Assistant to Mr. J. T. Haines, Rotherham's Gas Engineer and General Manager)—see "JOURNAL" for April 27.

Alderman R. KIRK (Chairman of the Gas Committee) presided over the brief ceremony, and mentioned that they had taken the opportunity to include in the features to be formally opened the stand-by water gas plant. This plant, installed two years ago for use in case of emergency—in view of the fact that Rotherham manufactures no coal gas, taking its supply of crude gas in bulk from the South Yorkshire Chemical Company's coke oven plant—had never yet been called upon, and they had no reason to hope it would be called upon, although it was essential they should have it there in case of need. While the primary purpose of the handsome new showrooms was to encourage the sale of appliances and the consumption of more gas by the public, there was more behind the occasion. There had been need for extension of display and also of the workshops, and at the same time the Corporation had been anxious to improve the general amenities of the town, including the appearance of that particular street leading to the famous Chantry Bridge. This scheme, he felt, had achieved these various purposes.

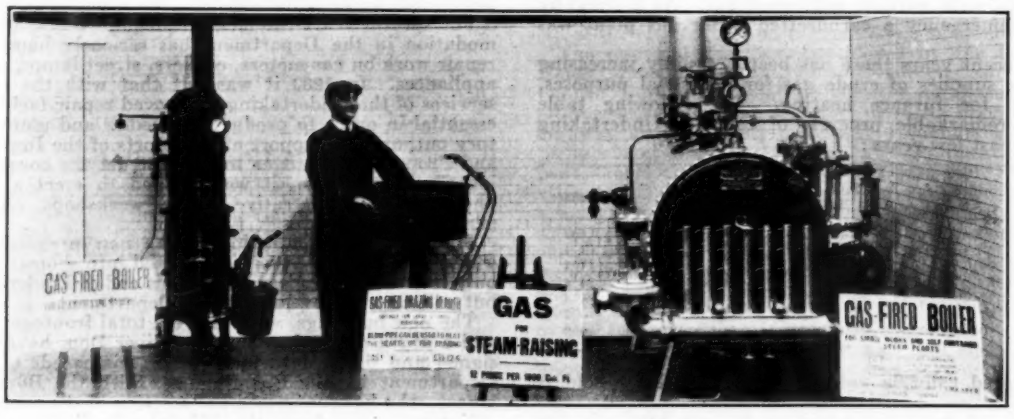
A CHEAP GAS SUPPLY.

Rotherham gas was already almost the cheapest in the country, and they had made a good deal of this fact in their advertising at the British Industries Fair, especially in its relationship to the vast assistance which cheap gas could give to industrial concerns. Yet they did not consider for a moment that they had reached the last word in cheap facilities even in Rotherham, and the Committee had under consideration the idea of establishing a service charge of, say, 6d. per week, which would probably enable the Department to supply gas for domestic purposes at a consumption price as low as 1s. 6d. per 1000 c.ft.

The MAYOR, declaring the showrooms and other premises open, welcomed the presence of ex-Alderman Gummer, now of Bridlington, and formerly Chairman of the Rotherham Gas Committee for 23 years. As one who regarded himself as impartial as between one public service and another, he did feel that for a good many years the Gas Industry had tended to lag, but the advent of electricity had brought about a revival, and the Gas Industry was making strides almost beyond belief. He suggested that the adoption of a tariff system on a basic service charge would create a tremendously increased market for gas. His Worship said he considered the present policy of the Gas Committee a very promising one. In Mr. Haines, their new Engineer and Manager, they had, he believed, the right man.

The Mayor said he was glad to see present that day a large gathering of the younger men in the Gas Industry. He wanted to urge on them that they could not learn too much about their own Industry. To the young men of the Rotherham Department itself, he emphasized that, although the town had ceased to manufacture gas, it was in their interest, and in the interest of their Department, that they should also know everything possible about gas manufacture, because in the greater part of the country coal mines were not so readily available as in the Rotherham area, and it would be a long time yet before coke oven gas would be available for gas undertakings generally.

Councillor J. DICKINSON, moving a vote of thanks to the Mayor, said that the opening of the new premises marked an epoch in the history of the Rotherham Gas Undertaking and in



As with the other night photograph of the Rotherham Showroom Window Display, the only source of illumination was concealed gas lighting.

the scheme now in hand for popularizing the greater use of gas for both domestic and industrial purposes.

Councillor BARLOW, Vice-Chairman of the Gas Committee, seconded the resolution.

The gathering subsequently adjourned to the Assembly Rooms at the Rotherham Town Hall for tea, by invitation of the Corporation Gas Committee.

The Chairman of the Gas Committee presided, and was supported by the Mayor and Mayoress and other public representatives.

Mr. HAINES, called upon to address those present, said he wished to take the opportunity of expressing his appreciation of the kindness and consideration which had been shown him since he came to Rotherham twelve months ago. The achievement they had seen that day was by no means an outcome of his own efforts, but was originated by his predecessor. It had been his (Mr. Haines') privilege to be responsible for rounding it off and completing it, but he was proud of the work of the originator. This was a day when everything must be done to eliminate waste. For years there had been great waste in millions of cubic feet of coke oven gas blowing to waste, and very few, even among technical people, had taken much notice of it. In Rotherham they had endeavoured to do their bit towards eliminating that wastage, and he thought they could claim to have made a considerable success of the effort.

Mr. J. W. HOLROYD, as President of the Yorkshire Junior Gas Association, proposed hearty thanks to the Mayor, Corporation, and Gas Committee of Rotherham for their hospitality during the day.

Mr. J. BRIDGE, Engineer and General Manager to the Elland-cum-Greetland Gas Company, seconding the vote of thanks, said it was a special pleasure to do so because he had known very well Mr. Haines' predecessor at Rotherham (Mr. Cook), and also Mr. Cook's predecessor. Furthermore, they had in their new Chief Assistant and the new President of the Yorkshire Junior Gas Association one who had worked for seven years at Elland, and to whose efficiency and loyalty he (Mr. Bridge) was delighted to be able to testify.

The MAYOR, responding, said he hoped that before long they would have something further to show in gas utilization in Rotherham. There was no limit to the possibilities of gas or its bye-products, and it was not inconceivable that Rotherham might have the privilege of being among the pioneers in using such products for road transport. Mr. Haines and the Corporation Transport Manager had just returned from a visit to the Continent, where they had been inquiring into transport possibilities by gas or gas products. He was not sure whether they had found the Continent able to teach them very much, but, if not, then it was up to Rotherham to produce some ideas of its own.

BANGOR'S GAS-WORKS*

Working of Glover-West Continuous Verticals in Ireland

In the year 1883 Bangor (Co. Down) was governed by Town Commissioners, who purchased the gas-works from the Bangor Gas Light Company for the sum of £750. At that time there were 121 gas consumers. At the present time the value of the Undertaking is approximately £200,000, and the consumers number 4900. The rapid progress of the Undertaking during the last 50 years is illustrated by the fact that in the year 1883 the consumption of gas was 1,194,000 c.ft., which is about equal to 1½ days' supply at the present time.

The present Engineer and Manager took up his duties in April, 1901, and so rapid was the development of the Undertaking in the first decade of his service that he found it necessary to install new plant and machinery to cope with the demand. The first instaliation of Glover-West vertical retorts was built in 1914, when the make of gas was at the rate of 51,847,000 c.ft. per annum. It consisted of 12 33 in. by 8¼ in. retorts 20 ft. 10 in. long, built in fire-clay moulded sections in units of two. Gas-making commenced in October, 1914. These retorts were replaced by 33 in. by 10 in. silica retorts of the same length, six in 1920 and six in 1921, and, at the same time, the settings were modernized by the introduction of the internal waste-gas uptake, and in June, 1922, the first extension of eight retorts on similar lines was brought into operation. A further extension of eight 40 in. by 10 in. retorts on the new model was brought into operation in February, 1928. This last setting was equipped with a natural draught waste-heat boiler, and a lift was added for access to platforms and as a stand-by coal plant. The coal-handling plant consists of a single line of gravity-bucket conveyor and a coal breaker, and the coke is transported by barrows to the adjacent coke yard.

The auxiliary plant comprises one set of vertical water-tube condensers, capable of dealing with 750,000 c.ft. of gas per day, and a set of horizontal water-tube condensers capable of dealing with a million c.ft. per day, one set of exhausters for 80,000 and two sets for 30,000 c.ft. of gas per hour, one horizontal washer scrubber with a capacity of 300,000 and one with a capacity of 500,000 c.ft. per day, one Livesey washer, of half-million daily capacity, two purifiers 33 in. by 20 ft. by 6 ft. and four 20 in. by 20 ft. by 5 ft., a station meter capable of passing 40,000 c.ft. per hour, two spiral gasholders—one of 800,000 and one of 250,000 c.ft. capacity—and three station governors, 10 in., 12 in., and 14 in.

An analysis of the cost of manufacture shows that gas is produced at a very favourable figure in spite of the high price, 27s. per ton, which has to be paid for coal of adequate quality. The latest returns are as follows:

	Per 1000 C.Ft. d.		Per Therm. d.
Coal, *less* residuals	7·96	..	1·94
Purification	0·06	..	0·01
Salaries	0·97	..	0·24
Wages	2·94	..	0·72
Maintenance	1·71	..	0·42
Net cost into holder	13·64	..	3·33

* From the April issue of "West's Gas."

The whole of the carbonizing plant is in excellent condition and the results have exceeded all expectations. For the year ended March 31, 1931, the returns are as follows:

Gas made, 222,461,000 c.ft.
Coal carbonized, 10,526 tons.
Gas made per ton, 21,130 c.ft.
Average calorific value, 410 B.Th.U. (gross).
Coke and breeze for sale, 6 cwt. per ton of coal carbonized.
Tar for sale, 15 galls. per ton of coal carbonized.

The maximum daily output for the year ended March, 1932, was 864,000 c.ft., about 1/250 of the annual output, while the minimum was 461,000 c.ft.

The Council has long been in favour of an active and forward sales policy. When the selling of gas appliances was first inaugurated in 1909 the receipts from this department were £16, but in 1929 they had increased to £3582 per annum. In the latter year the Council opened greatly enlarged offices and showrooms. These are fitted in the most up-to-date manner and full advantage is taken of the ample window space for arranging attractive displays of the latest gas appliances. So successful has this policy proved that in 1931 the receipts for cooking and heating appliances were approximately £5000. A further extension is now being erected which will serve as a demonstration room for cookery and other lectures, as well as for additional showroom accommodation.

The growth of the undertaking and its promise for the future is indicated by the following table:

Year Ended March 31.	C.Ft. of Gas Made.	Price per 1000 C.Ft.	Number of Consumers.	Stoves on Hire.	Receipts.
		s. d.			£
1883 . .	1,194,000	5 0 net	121	..	..
1901 . .	7,947,700	3 9 ,,	567	..	..
1910 . .	36,441,000	3 6 ,,	1457	262	7,690
1915 . .	56,870,000	3 4*	2104	650	11,786
1920 . .	82,317,000	5 0*	2429	1090	27,805
1925 . .	157,172,000	3 6*	3329	2134	43,057
1930 . .	222,461,000	3 2*	4748	2864	45,442
1932 . .	221,000,000	3 2*	4934	2893	45,439

* Less various discounts and rebates. These are on a generous scale. In addition to a discount of 5 p.ct. for prompt payment of all accounts, there are rebates, beginning at 5 p.ct. for an annual consumption of 120,000 c.ft., rising to 15 p.ct. for an annual consumption exceeding 501,000 c.ft.

The price charged for gas within the Borough is the second lowest in Ireland, and is actually less than the pre-war figure. It is confidently anticipated that the revised table of discounts and rebates introduced at the commencement of the current financial year will prove a decided attraction to consumers and result in a continued growth, both in number of consumers and in total gas consumption.

B. M.

THE "JOURNAL" TECHNICAL RECORD

Which contains Reports of Meetings of Gas and Allied Associations

Eastern Counties Gas Managers' Association

Presidential Address* of P. D. Walmsley, Great Yarmouth

Before proceeding with my address I should like to thank you all for the great honour you have conferred on me in electing me your President. It is an honour which I have not sought, as I am conscious that there are many members of this Association more capable of filling this high office than myself; however, I shall do my best to uphold the high standard set by my predecessors in the Presidential Chair.

In these days when there is such a plethora of conferences, meetings, &c., not to mention the excellent Technical Press, it is difficult to find some subject to deal with which has not already been dealt with, and something to say which has not already been said elsewhere. In the present instance the scope is further limited, as the whole of our works, processes, and practice were fully dealt with in the paper which I had the pleasure of presenting to you at Southend a few years ago. There are, however, one or two additions to our activities since then which I propose to deal with in due course.

The Great Yarmouth Gas Light and Coke Company was formed under a Deed of Settlement bearing date Nov. 15, 1824, and it was in that month that gas for public and private lighting was first supplied in Yarmouth. A contract was entered into with the Paving Commissioners (a body whose functions corresponded to those of the Town Council of the present day) to supply the town with gas for public lighting.

Twenty-one years later, in 1845, a new Company was formed for the purpose of carrying out " . . . the existing contracts or arrangements with the Commissioners under the Act of the fiftieth year of King George III. (1810) and for making and executing any similar contracts or arrangements with the Commissioners for lighting the streets, highways, lanes, passages, &c., with coal gas."

At the first meeting of the Company the first business was the passing of the following Minute:

> It was resolved that at all meetings of the Directors the attendance should be punctual, and any one failing when the clock strikes ten should be considered as not present.

In 1924, when we celebrated the centenary of gas supply in Great Yarmouth, I prepared a brochure dealing with the history, &c., of the Company and in the course of my search of the Company's early records I came across some very quaint Minutes.

Space will not permit me to quote them all but a few may be of interest:

Dec. 16, 1845.

> Complaint having been made that —— had been in the habit of absenting himself from the service of the Company on the day following Christmas Day for the purpose of obtaining Christmas Boxes, the Secretary was desired to inform the men generally that no such contributions should in future be levied by them in pain of dismissal from the service of the Directors.

June 26, 1846.

> A Special Meeting of the Directors was summoned for this day, but no Directors attended.

Aug. 4, 1846.

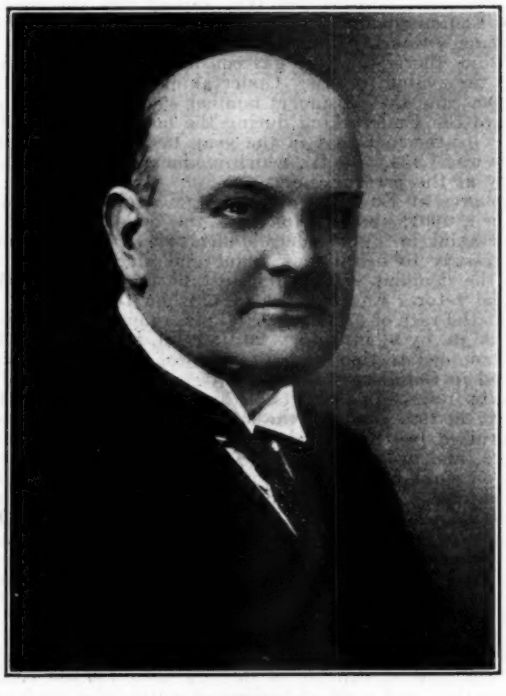
> The Secretary also stated that the Foreman, ——, was in such a state of ill-health as to be wholly incapacitated from business without hope of recovery, and the Works very much required the superintendence of a vigilant, honest, and intelligent foreman. That he called on Sunday afternoon to inquire after ——'s health, when he found the house in a state of great confusion, and poor —— with his head between his hands appealed to Secretary for protection from the violence of his wife.

June 1, 1847.

> Meeting of Directors at the Board Room on Tuesday, June 1, 1847, present: Mr. W. M. Fellows and Mr. J. J. Fellows; too late, Messrs. Burton, J. H. Palmer, and H. V. Worship.

In these early days much progress was made in the development of gas lighting, and in 1846 the Directors appeared to have felt the need of expert guidance in the extension of the Works of the Company, and they resolved at a Meeting held on May 5, 1846, to write to Samuel Clegg, Esq., and " inquire of him if it will be in his power to come and what will be his charge for a visit to Yarmouth to advise upon the alteration and extension of the Works."

Mr. Samuel Clegg was one of the early pioneers in gas engineering and introduced many improvements and inventions in connection with gas appliances. Mr. Clegg later reported upon the condition of the Works and advised the Directors as to future extensions.



THE PRESIDENT.

P. D. WALMSLEY, of Great Yarmouth.

Mr. Walmsley was apprenticed for five years in the offices and works of the Tyldesley Urban District Council's Gas and Water Department. This was followed by three years at Owens College, Manchester (Victoria University), where he specialized in Mathematics and Engineering. He obtained the College Certificate, First Class with Honours, in Mathematics and Engineering, and also B.Sc. Honours Degree in Engineering. For twelve months he was in the drawing office of Messrs. R. & J. Dempster, Ltd., Gas Engineers, Manchester; then, for three-and-a-half years, he was Assistant to Mr. George Helps, of the Nuneaton Gas Company. From 1908-19, he was Gas and Water Engineer to the Wombwell (Yorks.) Urban District Council. In 1919 he was appointed General Manager and Engineer to the Great Yarmouth Gas Company, and in January, 1931, was given a seat on the Board, with the position of Managing Director.

The Minutes of the Meeting of Directors held on Jan. 5, 1858, contain the following:

> The Indenture of Apprenticeship of Charles Hunt was sent in by Mr. Worship, was sealed with the Company's Seal, and returned to him for safe custody.

* Delivered to-day at the Spring Meeting at Great Yarmouth.

The Charles Hunt referred to in this Minute is the late Mr. Charles Hunt, M.Inst.C.E., who was Chairman of the South Suburban Gas Company, and previously Chief Engineer to the Birmingham Corporation Gas Department.

Another notable name in the Gas Industry which appears in the records of the Company is that of Mr. Harry Townsend, M.Inst.C.E., late Managing Director of the Wakefield Gas Company, and father of our esteemed colleague Mr. W. W. Townsend, of Colchester, who was appointed "An Apprentice to the Directors in July, 1868, and who left the Company's service with the best wishes of the Directors for his future success on obtaining an appointment under the Crystal Palace District Gas Company in March, 1875."

In 1863, the Company was incorporated by a special Act of Parliament.

I do not propose to take up time with a description of the Works for the reasons already given and as you have had an opportunity of inspecting them this morning, but I will deal with a few of the most important items in our daily practice which we have recently put into operation.

Gas Dehydrating and Naphthalene Removal Plant.

Previous to the installation of this process we had very considerable trouble at various times of the year due to deposits of naphthalene and water in service pipes, mains, and consumers' fittings, and not only was the removal of these deposits a source of expense to the Company, but, what was more important still, they were a continual source of annoyance to our consumers. "Always at your service" may be an excellent business motto, but in this connection the application is not happy.

Although the trouble from water deposits was not at all comparable to that from naphthalene deposits, it was considered desirable to remove the water vapour before the gas left the Works so as to prevent as far as possible the corrosion which undoubtedly takes place in mains, meters, and services when moisture is present in the gas, and also to do away with the cost of syphon pumping, clearing services, &c.

The trouble from water deposits has now been removed entirely, and as to syphon pumping, as an extra precaution we have the syphons on the larger trunk mains inspected about every six months, but beyond rapidly decreasing deposits during the first months after the installation of the plant we do not now find any water deposits at all.

In the case of naphthalene I need hardly point out to you the bugbear this is to the whole Gas Industry and the great advantages to be obtained by its removal on the Works. To give an absolutely uninterrupted supply of gas to its consumers is the duty of every gas undertaking, large or small, and not only we, but very many other undertakings have proved that it can be done. Undertakings which are not doing this at the present time are not only neglecting their own interests, but are not helping the Gas Industry at large to compete with the severe competition which it has to meet.

In the great majority of undertakings the gas as made is registered by means of a "wet" station meter, and in these cases there are two possible positions for the plant:

(1) On the outlet of the station meter before the gas enters the holders.

(2) On the outlet of the gasholders and before the station governors.

In the case of (1) a much smaller plant can be used than in the case of (2), as the maximum hourly make with which the plant would have to deal in this case is quite a different thing from the maximum hourly demand upon the district.

Position (1), of course, requires that the gasholders should have a film of oil on the surface of the water in the tanks to prevent re-absorption of moisture by the gas after treatment.

In our case the plant is fixed in position (1) on the outlet of the station meter.

The plant consists of a Holmes 5 ft. diameter rotary brush scrubber-washer in two units of six bays each, driven from the centre by a horizontal steam engine; 14 in. connections are provided with independent by-pass to each unit and the plant is capable of dealing with 1 million c.ft. of gas per day. The first unit comprises the gas-drying section and is supplied with calcium chloride solution by a pump driven from the engine shaft. Auxiliary apparatus in connection with this section comprises a storage tank for the $CaCl_2$ solution and an evaporator (heated by the exhaust steam from the engine) for concentrating the solution.

The second unit comprises the naphthalene washing section and is provided with a tank for gas oil feed to the plant, semi-rotary hand pump for replenishing same and a storage tank for the used oil.

Working.

Gas-Drying Section.

The stock solution of calcium chloride is pumped from the storage tank through the cooler and into the gas-drying section of the washer. In its passage through this unit the solution becomes warmed by the heat given up by the water vapour changing to liquid state in its absorption by the solution and slightly diluted. This weakened and warmed solution flows from the washer to the storage tank and is re-circulated through the cooler to the washer. After passing through the cooler about 5 p.ct. of the solution is by-passed to the evaporator and concentrated. The evaporator is placed immediately over the storage tank and the concentrated solution flows therein together with the weakened solution from the washer. The temperature of the solution is kept as low as possible and its specific gravity as high as practicable. These factors are controlled by adjusting the water supply to the cooler and varying the volume of solution passing to the evaporator.

Naphthalene Section.

In this section gas oil at the rate of 40 gallons per million c.ft. of gas treated is admitted each morning. With this quantity of gas oil naphthalene is completely removed. The used gas oil is passed to the C.W.G. plant.

Testing.

Dew-point tests are made daily at the outlet of plant and outlet of station governor, and the result at the plant is compared with the theoretical dew-point calculated from the vapour pressure of the calcium chloride solution. The result of the test at the governor outlet is compared with that obtained at outlet of plant to see that re-saturation of the gas in its passage through the holder is within the limit (re-absorption increases the dew-point by from 2° Fahr. to 6° Fahr.). The apparatus used to determine the dew-point of the treated gas is an adaption of the dry and wet bulb hygrometer. The gas passes the thermometer bulbs at a definite rate and from the lowering of the temperature by evaporation recorded at the wet bulb thermometer the dew-point of the gas is calculated. A small stream of gas from the outlet of the naphthalene section is continuously bubbled through a wash-bottle containing a saturated picric acid solution. This gas is first passed through a wash-bottle containing water to re-saturate it so that the gas will not pick up water from the picric acid solution.

Typical average results for summer and winter working are given:

—	Solution Entering Washer.		Solution Leaving Washer.		Dew Points.			Temperature of Gas at Governor Outlet.
					Theoretical.	Washer Outlet.	Governor Outlet.	
	° Tw.	° Fahr.	° Tw.	° Fahr.	° Fahr.	° Fahr.	° Fahr.	° Fahr.
Summer .	78	67	77½	69	40·8	41·3	46·5	63
Winter .	75	48	74½	49	26·0	27·6	30·7	44

To ascertain the effectiveness of dehydration on the district a series of dew-point tests were carried out at varying points after the plant had been in operation for six months and the following are the average results for twelve occasions:

At Works.	¾ Mile.	1¾ Miles.	3½ Miles.
° Fahr.	° Fahr.	° Fahr.	° Fahr.
28·7	29·6	30·6	31·5

The total cost of treatment for removal of water vapour and naphthalene, including interest and depreciation of plant (10 p.ct.), labour, calcium chloride, steam, water, oil, grease, and sundries, works out at just under ½d. per 1000 c.ft. This does not include cost of gas oil as this is afterwards used in the C.W.G. plant.

I consider the installation of this plant to be one of the finest investments the Company ever made, as we are now entirely free from stoppages of any kind in mains or services, and our customers have a full and adequate supply of gas at all periods of the day and at all seasons of the year. What this represents in money cannot, of course, be assessed, but in the goodwill and satisfaction of our consumers it is a tremendous asset.

As to the effect on the meters on the district there is no doubt a steadily progressive improvement, and the number of meters brought in for repairs is gradually decreasing.

As to the saving in cost of repairs it is impossible to give figures as the position is complicated by the fact that at the beginning of the last financial year we started to repair the whole of our meters ourselves; also we started a systematic campaign for examination of the whole of the

meters on the district, and very large quantities have been brought in under this scheme according to age, and not necessarily because they were defective.

Stove Re-conditioning Shop.

This shop is so designed that the appliances move round the building in one direction for each stage of their renovation. Cookers on entering are stripped of all loose fittings which latter are placed in a metal basket for boiling in a caustic bath. The cookers are liberally coated with "Stripso" and stood on one side for some hours. They are next placed one at a time upon a turn-table in the washing-bay and thoroughly washed down with a water jet at a good pressure. A drying oven is provided which is heated by the waste gases from the gas burner under the caustic bath. When dry the cookers move forward to the spraying booth for spray-painting by the Aerograph method, while the cleaned fittings, &c., are dipped in a paint bath and laid on a draining rack over the bath to dry. A buffing machine is provided for polishing the hotplate fronts, &c., and a polishing lathe is installed for treating the brass cocks, &c. An 8¼-h.p. gas engine provides the motive power for the air compressor, lathe, buffing machine, exhaust fan, and water pump. The water for washing down is obtained from a well which has been sunk beneath the floor of the shop, and a large bench completes the equipment. A store-room is provided in one corner for carrying a stock of cooker tins and other parts which may need renewing.

The shop was first started up in February of last year and to the end of 1931 the following were renovated: 651 cookers, 93 grillers, 106 boiling rings, 16 hotplates, 48 fires, and 69 sundries (radiators, &c.)—a total of 983 appliances.

The cost of converting the building (previously a disused coal store) was £112 and including fitting up complete was £485. Ordinarily, two men and a lad are employed in the shop, but during our busy periods an additional man is put in, and with this staff a throughput of five cookers per day is maintained at a weekly labour charge of £11 or approximately 8s. per cooker.

Meter Repairs.

As previously stated, we now undertake the repair of our own meters, and I propose briefly to describe the equipment of the repair shop and the general procedure in the repair and testing of such meters.

For this purpose I propose to deal with the matter under the following heads:

1. Accommodation.
2. Plant and equipment.
3. Method of repair.
4. Testing:
   - (*a*) Sounding.
   - (*b*) P.U.G. test.
   - (*c*) Burning-off.
   - (*d*) Calibration.

Accommodation.—In this respect we are fortunately placed, occupying practically the entire area of the second floor of our showroom building, and being equipped with a suitable lift which facilitates handling of the meters from the ground floor. The benches are so arranged as to afford each tinman the full benefit of daylight. Apart from the usual means of ventilation there are two 12-in. rotary ventilators fixed in the roof, and air bricks fitted in ventilating shafts abstract as much as possible of the fumes unavoidably produced in the process of meter repairs.

Equipment.—Our equipment and lay-out, which consists of—

1. A 2½-h.p. electric motor 600 r.p.m. driving,
2. A vertical single-piston air compressor,
3. 1 6 ft. by 3 ft. cylindrical rivetted and welded air receiver fitted with relief valve,
4. 1 reducing valve with gauges registering inlet and outlet pressures,
5. 1 5 ft. Parkinson & Cowan test holder for calibration purposes,
6. 1 5 ft. test holder for sounding, P.U.G. test, and burning off,
7. Sounding, burning-off, and P.U.G. testing benches,
8. Dark room,
9. The usual tinshop machines,

has been designed with the primary object of meeting our convenience and immediate demands. Much more expensive apparatus could be installed but would serve no useful purpose apart from improving the outward appearance. The object of the first three items is to supply under pressure sufficient air suitably controlled for all testing purposes, including:

1. Sounding.
2. P.U.G. test.
3. Burning-off.
4. Calibration.
5. To enable the test holder to be quickly filled.

The electric motor is connected by means of a direct coupling to the compressor, which in turn is connected to the receiver, fitted with a relief valve set to release pressure when in excess of 60 lbs. per sq. in., although the receiver has been tested to maintain a pressure of 120 lbs. per sq. in.

The air to the compressor is abstracted from the room with a view to maintaining as far as possible an even temperature throughout for all testing purposes.

From the receiver a supply is extended to the 5 ft. calibration holder, and prior to connecting at the inlet of the holder a reducing valve is fitted with necessary control valves reducing the 60 lbs. per sq. in. pressure to 10 lbs. per sq. in., sufficient to lift the holder quickly, the supply is teed and continued to the holder used for sounding, P.U.G., testing, and burning-off. This holder is lead-weighted to give a 10-in. water column pressure (5 in. over, or exactly double the pressure required by the Board of Trade). The supply, after serving the sounding bench, is reduced by means of a governor to 5 in. water column pressure to feed the P.U.G. test bench. The 10-in. pressure is continued in the opposite direction to feed the burning-off bench. A further device is fitted to this holder for automatically controlling filling operations.

The dark room is provided for the purpose of testing all meter diaphragms prior to their being dressed.

Issuing of Work.

Method of Repair.—Meters removed or exchanged are returned to the stores to enable the storekeeper to maintain his necessary records. The ruling of his record book is arranged to provide all details concerning the travel of the meter from the time it is brought into the stores, the repair made, and returned back into the stores ready for issue. When the issue is made both the fitter's job card number and the address is recorded against the meter in the storekeeper's record book.

All meters returned to stores are sent to the meter repair shop the following morning. The foreman of the shop also keeps records of all meters received, job number of repair, and date returned to stores, which affords a check on all meters received by the storekeeper and meter foreman.

A "job" comprises six meters, if possible all of one size, and these are issued to the tinman on a job card bearing a reference number, and by this number the actual repair made on an individual meter can be traced. The job card is so planned as to show easily the value of the work completed and the materials used on any particular meter.

All meters when received in the meter shop are examined to determine the year made, and if the meter proves to be over ten years old since supplied as new, or if it is ten years since it was last repaired, it is stacked to be opened for examination of the diaphragms, which may require either to be oiled or to be renewed. If the meter is under ten years old it is tested to prove its accuracy or otherwise, unless it is specially marked "stopped registering," "passing unregistered gas," or "leaky," when it would be opened and follow the ordinary course of repair.

In the case of a full repair, the work is done in the following stages:

1. Each of the six meters are fully opened, the tops, valve box covers, backs, and fronts are removed. The foreman then examines each meter and appends to the job card the exact amount of work necessary for repair, together with materials required. All parts dismantled from the meter by the tinman are numbered corresponding to the number given to the meter to facilitate re-assembling.
2. Defective diaphragms, rims, white metal stuffing boxes are removed and the interior of the meter thoroughly washed with paraffin (paraffin is the best cleaning medium for meters as it has no harmful after effect on the leathers).
3. Old solder is cleaned off and removed from the interior and exterior of meter and all edges are re-tinned ready for a fresh soldering.
4. New diaphragms and rims are fitted of a larger diameter for the purpose of increasing the capacity (from a "light" capacity to a "standard" capacity).
5. Fittings in the upper chamber are removed and cleaned, and the valves are re-ground to ensure an absolute flat surface and so prevent passing of unregistered gas.
6. Inside movements are now fitted, flags, motion wire feet, and guides are re-soldered.
7. The meter is re-examined by the foreman who proves even surface of valves, proper adjustment of guide wires to allow diaphragms to travel in a horizontal direction freely and perfectly straight.
8. Backs and fronts are re-soldered.

9. New brass stuffing boxes are fitted and stuffed with specially prepared wool with suitable washer at top and bottom, the fittings of the upper chamber are erected, index set to zero, valves set, and the valve box covers soldered in position.
10. In the case of a slot meter, the attachment is dismantled, overhauled, and the auto valve examined and re-lubricated with tallow and re-fitted.
11. The meters are again examined to ensure that the gearing and action spindles are sufficiently in gear with their respective worms.

Testing.—Subject to the above operations proving satisfactory, the meters are then tested for external soundness by submitting each meter to a pressure of 10-in. water column (here it may be mentioned that this pressure is 5 in. in excess of the statutory requirements). This is done by means of a rubber tube and brass nozzle connection being made at the inlet of the meter suitably sealed with putty and fed from the holder weighted to deliver 10-in. water column pressure at the outlet. A certain quantity of air is passed through the meter with open end and which is then sealed with a brass cap. The control tap on the supply is then turned off and observation is maintained on a water bubble gauge, used for the express purpose of determining the finest leak. If no leakage is proved on the gauge after three or four minutes' observation, the meter is passed to the P.U.G. test bench.

The supply to this bench is a continuation of the supply delivering a 10-in. water column pressure, but at this stage it is reduced by means of a governor to 5-in. water column pressure in accordance with the statutory requirements. Each meter is then fitted with a control unit to pass the following rates which are within the limits of the statutory regulations:

3 lt. or No.	2	½	ft. per hour.
5 ,,	3	¾	,,
10 ,,	4	1	,,

By this test the meters make a complete revolution of the tangent, and if proved within the required test are passed for calibration test, except in the case of slot meters which are placed on the burning-off bench for the purpose of testing the prepayment mechanism and permitting the action valve to close down by the meter mechanism. When the valve is closed an appropriate coin is inserted in order to ascertain whether such insertion ensures the delivery of the appropriate quantity of gas on the first coin, and to ascertain that the valve shuts completely on the exhaustion of the supply for which prepayment has been made. The amount registered is checked by means of a test meter. All meters are then finally tested for accuracy of registration in accordance with the Gas Meter Regulations, 1920.

Meters ready for calibration test remain in the test room for a period of twenty-four hours before being tested. Subject to the meters passing the calibration test, they are returned to the tinman, who re-solders the top of the meter and affixes seal ring and property badge. The meters are now ready to be sent to the Official Test Office at Norwich for official stamping.

When the meters are returned from the Test Office they are painted with one coat of sublimed blue lead paint which is followed by one coat of enamel. The meters are then returned to the stores ready for issue.

Gas for Fish and Potato Frying.

I had intended to deal rather fully with the subject of gas for fish and potato frying, but as this has been so exhaustively covered by the articles in the Industrial Gas Supplement to the " Gas World " of March 19 last, I shall content myself with stating what we have been able to do in this direction in Great Yarmouth.

Realizing the undoubted advantages of gas for this purpose, we started in 1925 an intensive campaign to capture this business.

It did not take us very long to realize that there was one great stumbling block to our progress in this direction—potential customers could not meet the initial capital cost involved in the installation of the more expensive types of ranges on the market, and conversion sets for brick-built ranges were not very successful in those days, so that we could only get the business if we were prepared to supply an efficient but cheap range on easy payment terms.

We overcame this difficulty by designing and making a gas-heated range which we could supply at a very moderate price and which is thoroughly efficient. We now sell these ranges, which are very robustly built, on hire-purchase terms (three years) or for cash outright. When we started in 1925 we had two customers using gas for fish and potato frying, while at the present time we have forty using gas exclusively out of a total of fifty fryers (excluding a few portable stalls) on the district, and we are hopeful of converting the other ten. The aggregate number of pans now using gas exclusively is 125.

The progress of gas sales for fish frying is shown by the following table:

Year	1925.	1926.	1927.	1928.	1929.	1930.	1931.
Sales of gas in thousands of c.ft.	395	1329	4530	6225	8416	11,392	11,372

You will notice there is a slight decrease in sales in 1931 as compared with 1930, but this is due to the wretched holiday season and the comparative failure of the herring fishing in the late autumn.

The holiday season here starts in July and usually goes on to the middle of September, but last year it practically finished after Bank Holiday week, and the fishing season, when thousands of Scotch people are in the town for usually about eight weeks, only lasted four weeks.

A number of additional ranges were put out in the first half of last year in anticipation of holiday season needs, and we expected a considerable increase in sales over the previous year, which I think we were justified in doing, seeing that the sales in the first half of the year had increased from 4,165,000 c.ft. to 4,847,000 c.ft., an increase of 16·4 p.ct., and this in the slackest part of the year.

However, we must console ourselves with the fact that the apparatus is there ready to meet the demand when things are in a more prosperous condition, and that when this comes we shall undoubtedly see a considerable increase due to this additional apparatus.

The following are the annual consumptions for 1931 of four of our largest consumers:

	C.Ft.
A	837,900 (2 shops)
B	1,198,500 (3 ,,)
C	1,079,800 (3 ,,)
D	544,900 (2 ,,)

Some General Observations.

I come now to some general observations on matters concerning the administration of our Industry as a whole, and the first thing which strikes one is the farcical conditions under which the Industry has to compete for its existence.

The conduct of our business is governed largely by conditions which were imposed in the early days of gas supply when gas was supplied mainly for lighting by flat flame burners. Since that time the whole basis of our Industry has been revolutionized; we no longer have a monopoly, and gas, instead of being used for practically one purpose only—viz., lighting—is now used for a variety of purposes, the number of which is truly amazing. Moreover, we are in the fiercest competition with a commodity which has been and is being fostered, pampered, and subsidized by successive Governments irrespective of Party. We have had the very unedifying spectacle of Ministers of the Crown stumping the country and boosting the claims of our competitor.

The Gas Industry asks for no favours—only fair play; and when successive Governments have been asked to remedy the injustices which admittedly exist, proposals for which have been made by a Government Committee itself, we are told there is no time! There has been plenty of time devoted to the interests of our competitors during many years past now.

What are the reasons for this state of affairs? I believe it is " ignorance of the true state of affairs." I believe the average Member of Parliament, so far as the Gas Industry is concerned, is no better informed than the " man in the street." He sees colossal sums being voted for the purposes of a rival industry and jumps to the conclusion that we must be a decaying Industry, and that it is only a matter of time when we shall go out altogether. He does not realize the importance of the Gas Industry, an Industry employing £200,000,000 of the public's money, giving employment to 113,000 persons, and using 18 million tons of coal per annum.

What is the remedy? I believe it is, and will become increasingly, necessary that we should have " Representation in Parliament " more commensurate with our importance as a tax-paying Industry. There is no need for me to particularize, we can all call to mind the names of men whose educative propaganda work in Parliament would be a God-send to the Gas Industry, and who could command the attention of the Government to matters which they might bring forward on behalf of the Industry.

I am not unmindful of the excellent services rendered by the Member for Newport (Mr. R. G. Clarry) and some of our friends on the Labour side, and the thanks of the Industry are due to them; but I should like their numbers increased so that the Gas Industry's representation is more commensurate with its importance.

Another matter which chiefly concerns the heads of undertakings outside the immediate vicinity of London is

the ever-increasing amount of time which is taken up in attending meetings of the various committees, conferences, &c. I should be the last in the world to belittle the usefulness of these meetings, and I have nothing but praise for our various National organizations. I am convinced they are all serving very useful purposes and are very necessary for the efficient conduct of the various ramifications of the Industry; but I think that by friendly co-operation between the various bodies a scheme might be evolved whereby the number of visits entailed in attending these meetings could be considerably curtailed.

In the natural order of things membership of these various committees is confined to a limited number of members in the different districts, and these men give ungrudgingly of their services and time; but I venture to think the majority of them would welcome a scheme whereby they devoted, say, two consecutive days each month to a succession of meetings if they knew they were free for the rest of the month.

I recognize that it would be impossible to avoid breaking this arrangement for special reasons, but I am convinced that some scheme on these lines could be evolved which would be preferable to the present arrangements.

Our National organizations are the envy of our competitors, and served as we are by such an excellent Technical Press the Gas Industry is extremely fortunate, and given fair play there is no reason why it should not continue to prosper and proceed from strength to strength.

I have purposely refrained from making this address an "excursion" from "retort to burner," and have endeavoured to confine myself to a few subjects which may contain some useful information to our members. Whether I have succeeded or not I do not know, but I thank you for the patience with which you have listened to it.

Coal Distillation in Internally Heated Rotary Retorts*

By Harald Nielsen.

Having described the 10-ton a day "L. & N." low-temperature carbonization experimental plant at Barnsley, the author said:

A full-scale commercial unit was erected in conjunction with a colliery near Ashby-da-la-Zouch. The retort was, in the first instance, designed for a throughput of approximately 100 tons of bituminous coal per 24 hours, but by rearrangement of the internal parts this was increased by 40 p.ct.

The plant was of the simplest type, involving the distillation of coal by burned producer gas. This method of heating was selected because at that time no profitable outlet could be found for gas of high calorific value, since the plant was situated some miles from the nearest town, but on a site most convenient to the colliery.

The plant consists of a retort provided with an electrically controlled fuel discharging device, automatic and continuous coal feed, and is driven by Luth & Rosen gear and motor, which normally consumes 16 amps. at 440 volts, this low power consumption being due to the careful adjustment of the supporting rollers and the high efficiency of the reduction gear.

The coal from the colliery is raised by an elevator to an overhead hopper having approximately 24 hours' capacity, and then passed automatically through a coal dryer of the standard rotary type, in which the moisture is reduced from 12-14 to 3-4 p.ct. before it enters the distillation retort. The coal dryer is heated by burned producer gas, generated in a producer, which also provides gas for the evaporation of the noxious liquor liberated from the coal, and removed by the condensing plant.

The coal, if desired, can pass by means of a spiral chute direct to the coal feeding valve of the retort, which also serves as an air lock.

The coal enters the retort through a fixed chute passing through a stuffing box, and by internal elevators and distributors is evenly distributed into each of seven large tubes, which form the interior of the retort. The coal thus travels downwards through the retort in seven distinct streams, and presents a very large surface to the heating medium, which travels in counterflow to, but in direct contact with, the coal. At the same time the coal and residual fuel suffer a minimum of abrasion, an important feature, since the coal with which the retort was designed to deal was of a friable nature.

After treatment, the hot residual fuel is removed from the retort through automatic discharge doors, electrically operated, and passes through an air lock, so that the outside atmosphere cannot enter the retort. The fuel is removed by feeders and screw conveyors, and may be quenched *en route* to the screening plant, or, if a high ash slack is being treated, it may be quenched in such a way that the lighter and pure fuel flows away in a stream of circulating water, while the heavy impurities, such as slate, stone, &c., settle by gravity and are removed by a bucket elevator.

The quenched residue is elevated to a rotary screen, which separates the fuel into the desired sizes, and the smalls pass to a briquetting plant of a standard ovoid type, where briquettes are made with a pitch, or smokeless binder, as desired. The hot briquettes are elevated to cooling and storage bunkers, which have a capacity of four days' output of briquettes, thus giving them ample time to cool and harden. From these bunkers they can be loaded directly into lorries or wagons for disposal.

The larger-sized residue cools in the bunkers under the screens, until of sufficiently low temperature to ensure safe handling.

The gas for distilling the coal is generated from raw coal in a standard producer of the rotary grate type. The hot producer gas passes through a dust catcher to a combustion chamber, where it is burnt with secondary air before passing into the retort. As the flame temperature of the hot producer gas would be too high for distillation purposes, the proper temperature is secured by mixing a certain amount of the stripped return gas with it, after combustion has taken place, whereby an adequate volume of heating medium at the proper temperature is secured for the distillation, and at the same time, any combustible gas present in the return gas combines with any free oxygen which may have escaped combination with the producer gas, and thus an atmosphere practically free from oxygen is always assured.

The gas leaves at the upper end of the retort where the raw coal enters, at a temperature high enough to prevent condensation of even the high boiling oil fractions. It then passes through a dust cyclone, kept well above the condensing temperature of the heavy oil vapours, where over 90 p.ct. of the dust inadvertently carried over is removed, so that a mixture of combustion gas, low-temperature gas, oil vapours, and a small quantity of dust passes from the cyclone to a dust tower, down which a small amount of liquor is sprayed to lower the temperature of the gas, and settle the remainder of the dust.

The condensation proper of the oil vapours now commences by passing the gas into an air-cooled condenser, which comprises a number of single sections built in the form of flat boxes, so as to secure the maximum cooling surface in a minimum space. These sections are separated by distance partitions, forming air channels through which air is forced by a ventilating fan. A small amount of liquor may be sprayed on the outside of the sections so that they may act as an evaporating condenser, thereby increasing the efficiency of the cooling surfaces. A definite amount of liquor is sprayed in the interior of the air-cooled condenser to assist in cooling the large volume of gas and converting the oil vapours into a mist or fog. After leaving the condenser, the gas, carrying the oil fog, passes through a series of four large tubular water-cooled condensers, in which any oil vapours which may have escaped conversion in the air-cooled condenser are converted into fog.

The total volume of gas, at a maximum temperature of 25°-30° C., now enters a high-speed centrifugal gas booster, which separate the oil fog from the gas and water vapour, and serves as a circulator for the gas, maintaining the proper pressure and gas velocity throughout the plant. In this apparatus 75-80 p.ct. of the total oil is separated from the gas. Any oil carried away in the gas leaving the booster is separated out in the following water-tube condenser and oil spray washer. After leaving the washer, part of the gas is allowed to escape to atmosphere and the remainder is conducted back to the combustion chamber to dilute and control the temperature of the products of combustion entering the retort. The ratio of the gas escaping to atmosphere to that being re-circulated is roughly 1:2.

The oil thus condensed, consisting of the very thick, viscous oil separated by the liquor spray in the air-cooled

* From a paper before the Institution of Chemical Engineers, April 20.

condenser, the thick oil from the water tube condenser, and the thinner oil from the centrifugal booster, is pumped into a couple of vertical continuous separating tanks, from which, with the addition of a small quantity of steam, and containing not more than 1-1½ p.ct. of dust, it is run off into underground storage and service tanks, and thence into the large oil tanks which have a capacity of three weeks' output.

The condensed water vapour and liquor separated from the gas and the oil have, like all liquors obtained by high or low temperature carbonization of coal, oxygen absorbing properties which render them unfit to be discharged into running streams. They have therefore to be rendered innocuous by permitting the condensed liquor to trickle through a tower filled with refractory bricks, and in which it is evaporated by burned producer gas, which afterwards passes through the coal dryer.

This is not the most economical and efficient way of solving this problem, but later a rearrangement of the condensing plant and the embodiment of a different principle will be discussed which makes use of the waste heat, to dispose entirely of the effluent liquor obtained in the process. When it is borne in mind what a serious problem the effectual disposal of effluent liquor presents in coke oven, refining, and distillation plants, it will be realized that this is a very important step forward.

New Application of the Jet-Condensing Principle.

The conservation of heat units is one of the main considerations in a successful coal distillation scheme, irrespective of its nature. In general, when employing internal heat, the exit gas carrying the oil vapours has to leave at a temperature which is somewhat above the condensation point of the heaviest oil fraction. The temperature of the heating medium entering the retort is generally between 650° and 750° C., and the exit temperature between 200° and 250° C., to avoid condensation of the oils; so 30-33 p.ct. of the total heat entering the retort is present in the exit gas, and in ordinary condensing plants is removed by the condensing water, or air, and is, therefore, wasted. The conservation of the thermal energy has received our serious consideration for a long time, and a scheme has been evolved whereby this heat is used to evaporate the noxious effluent liquor.

The scheme finally adopted is an interchange of heat between the hot gas and the cold effluent liquor, which is circulated in direct contact with the gas, and afterwards the hot liquor is pumped over a cooling tower provided with either natural or forced draught. The air passing through the cooling tower, while cooling down the liquor, evaporates a portion of it which depends on the saturation and temperature of the air and the temperature of the liquor entering the tower. The volume and temperature of the liquor and the air are so regulated that by cooling and evaporation an amount of liquor is discharged into the atmosphere which corresponds to the continuous make in the retort.

Ordinary bituminous coal with an oxygen content varying from 8 to 15 p.ct. will produce in the form of combined liquor 20-30 gallons per ton of coal distilled in the retort. Adding to this the possible moisture content of the coal, which may vary from 3 to 10 p.ct., gives a total of 50-60 gallons of liquor which has to be rendered innocuous before it is discharged into streams or drains.

Effluent liquor from coal distillation plants contains valuable products, such as phenols, cresols, pyrocathecols, &c., but of a concentration so low that it does not pay to recover them, unless the liquor can be concentrated to a fraction of its former volume by using cheap or waste heat.

In this method of condensing the liquor is injected into the gas, so that in any given apparatus any desired cooling surface can be obtained by altering the amount of liquor sprayed into the tower and by the fineness of the spray.

The standard gas cooling or condensing practice may be likened to surface condensers, in which the steam surrounds, while the cooling and condensing liquor passes through the tubes, but this system of gas condensation is similar to the jet condenser, in which a jet of water, finally divided, enters the steam space, and presents a cooling surface which depends upon the volume and fineness of the spray, which can be varied within wide limits.

The hot gases from the retort, carrying the oil vapour and saturated with steam, leave the standard cyclone or dust collecting tower and enters another tower in which they come into contact with a spray of liquor of an intensity which corresponds to the temperature drop required. Leaving this primary spraying tower, they enter a second, where they are subjected to a direct spray of liquor in the bottom half and to a surface film of liquor distributed over packing material, such as the well-known propeller or ring fillings, in the top part, thereby being presented to a highly efficient cooling surface of liquor, which is continually varying. The object of filling part of the tower with packing is to provide a bulk of material in the gas path which by mass action will prevent great fluctuations in the temperature of the exit gas. The filling, therefore, acts as a thermal accumulator, or governor, giving off or absorbing heat as required. In this tower the temperature of the gas is reduced so that an amount varying from 20 p.ct. to 30 p.ct. of the total oil and the bulk of the steam and water vapour is condensed.

The gas then enters a final cooler, packed with smaller material, where it is again subjected to the cooling and washing action of a spray of liquor, which lowers the temperature to such an extent that all the oil vapour is converted into an oil fog, which is removed from the gas by passing it through the high speed centrifugal booster. The gas now contains only a small amount of light spirit, which would remain in vapour form in the gas at temperatures of 15°-20° C.

The effluent liquor is pumped into the final cooling tower and from there flows, in a countercurrent direction to the gas, through the other two towers, so that the liquor leaving the first tower has absorbed the sensible heat of the gas and part of the latent heat of the aqueous and oil vapours. The hot liquor runs into a separating tank, where the oil is either precipitated or collected on the top. After the separation of the oil, the liquor is pumped over a cooling tower similar to those seen in the vicinity of large power stations, and cooled either by natural or forced draught, thereby losing in volume an amount corresponding to the continuous make referred to above. The cooled liquor then re-enters the system and moves in a countercurrent direction to the hot gas.

A gradual concentration of the phenols, cresols, &c., in the liquor takes place, but this is kept at such a strength that no deposition of the material carried by the effluent can take place in any part of the apparatus. The concentration is 10-15 times that of the standard liquor which would otherwise have to be disposed of, or rendered innocuous. The valuable products carried by this highly concentrated liquor are recovered by further evaporation, or other treatment, but only 5-10 p.ct. of the original bulk of liquor has to be dealt with for recovery purposes, 90-95 p.ct. being dispersed into the atmosphere in the form of a fine mist or vapour. Thus, 30-33 p.ct. of the otherwise waste heat in the distillation gas is used in the concentration and disposal of by far the major part of the effluent liquor, and the gas is cooled to a temperature at which 90-95 p.ct. of the total oil can be recovered in practically an anhydrous state. Not only has the waste heat been utilized, but the bulk of the liquor has been disposed of, and an external supply of cooling water is rendered unnecessary.

New Steam Distillation Principle.

Up to the present the bituminous material has been distilled by means of a permanent gas. This gaseous heating medium may be combustion gas, as at the Ashby plant, but in this case the permanent gas of high calorific evolved from the coal substance is partially wasted, since the final gas issuing from the oil-extracting apparatus is of too low a calorific value to be used directly as such. In this plant about two-thirds of the permanent gas is returned to the plant, partly to ensure that no excess of free oxygen enters the system, and partly to give the proper volume of circulating gas, but the gas of high calorific value set free from the coal is a valuable item. and can be recovered by using as a heating medium a gas which can be burned, such as unburned producer gas, water gas, or a circulating gas. When using unburned producer gas, the gas producers will have to be operated at such a temperature that the gas leaving the generators is at a sufficiently high temperature to carry out the distillation. A scheme of this kind is as follows:

The coal enters the retort and is distributed inside the retort in the manner already described. The residual fuel, after leaving the retort, is quenched by a water spray, the steam thus created being used to start the air blast of the producer. The residue is screened and the larger sizes pass to the gas producers, and are converted into producer gas. The air blast is so arranged that the producer gas leaves the producer and enters the retort at a temperature between 600° and 650° C.

The oil is removed from the gas by condensation, either by indirect or direct cooling for the disposal of the effluent liquor. The final gas obtained will have a calorific value equal to that of the producer gas *plus* that of the gas set free from the coal, and will, therefore, have a calorific value 15-20 p.ct. above that of ordinary producer gas. This gas is eminently suitable for industrial purposes, since it has a higher calorific value than ordinary producer gas, is clean and cold, and can be carried without fear of soot or tar being deposited in the mains. It can be controlled in volume, &c., for heating operations to a far greater extent than the hot producer gas generally used, and does not depend for efficiency and high flame temperature upon the

sensible heat carried by the crude producer gas, which may vary from hour to hour, or on the human element.

By an increase of 15-20 p.ct. in the calorific value of producer gas, the saving in gas in an open hearth steel furnace, for example, will amount to more than that of the increased calorific value. Experience has shown that the saving effected in heat units is generally of the order of twice the added calorific value.

Instead of employing gas producers to give straight producer gas, water gas producers can be used, and the water gas will then be carburetted with the gas distilled from the coal, thereby saving a considerable amount of imported gas oil required to increase the calorific value of water gas for town gas use.

The fines and smalls screened from the residual fuel will find a ready market as powdered fuel.

In long-distance gas transmission the higher calorific value of the gas will involve a lower cost of pipelines, compressors, power, &c., to transport a given amount of thermal energy.

To obtain gas of the highest possible calorific value, however, steam must be employed as the distillation medium; but although this is an old idea, all steam distillation schemes hitherto have suffered from the inherent drawback of wasting, partially or wholly, the latent heat of the steam, as the temperature at which the coal must be distilled is of an order which precludes the employment of the latent heat for this purpose, and only the sensible heat of the steam can be utilized. A system has been evolved, however, in which the sensible heat of the steam is employed for coal distillation, and the latent heat is used for generating the steam required for the distillation.

The coal treatment is carried out in a standard retort, provided with a cyclone and dust-separating tower. The steam carrying the oil vapour and the permanent gas evolved from the coal leaves the dust tower at a temperature above the condensation point of the heaviest oil fraction. It then passes into an apparatus, termed de-superheater, where liquor is sprayed into the steam, oil, and permanent gas mixture to lower the temperature to correspond with the pressure. Here the sensible heat carried by the mixture is used to convert a volume of liquor into steam, and give a steam-oil vapour mixture at a pressure and temperature corresponding to saturated steam of just over 100° C. This saturated mixture passes into a multiple effect evaporator, of the countercurrent type, and evaporates the effluent liquor and produces a low-pressure steam having a temperature of 5-10° C. below that of the saturated steam and vapour mixture. The evaporator thus acts as a condenser, converting by far the largest quantity of the steam and oil vapour to a mixed hot liquor, which, together with approximately 40-50 p.ct. of the total oil present, runs into an oil separating tank. The steam and oil vapour and the permanent gas leaving the apparatus pass into a standard tubular water cooler where the remaining steam and oil are condensed and separated from the permanent gas, which passes along to a gasholder or other receptacle, and eventually through a light oil scrubber to remove the light oil present as vapour. The hot liquor, after the separation of the oil, is fed into the evaporator steam, and the low pressure therein produced is then compressed in turbo-exhausters to sufficiently high pressure and temperature to pass into superheaters and recuperators to be reheated for use in the distillation, so that the condensed liquor, as superheated steam, is continuously circulated through the retort. The surplus hot liquor is pumped over a cooling tower, in which an amount of liquor equivalent to the total make in the plant, is continuously removed by evaporation to the atmosphere.

The sensible heat of the distilling medium below the temperature at which it leaves the retort, together with the latent heat, is thus recovered and used in the plant, and the thermal cycle is as efficient as it is possible to conceive. The liquor is also disposed of by making use of the exhaust heat available in the form of waste heat. The superheaters and recuperators may be fired either by surplus gas, producer gas, or the fines and smalls of the residual fuel from the screening plant.

This method gives a gas of high calorific value, depending in volume and calorific value on the coal treated, the distillation temperature, &c., and varying from 650 to 900 B.Th.U. per c.ft., and would be ideal for compression and long-distance gas transmission. Considerable use is being made abroad of this gas by compressing it into cylinders for welding, lighting, and heating purposes, since it has twice the calorific value per unit of volume of town gas.

Thermal Balance of Distillation.

It is only within the last few years that proper attention has been paid to thermal balances in coal distillation. One of the reasons for this is the difficulty in allocating proper values when distilling coal by externally applied heat, since the heat losses in the flue gases, coupled with the radiation and convection losses from the brick setting, presented difficulties too great to be overcome, with the result that in attempting to compute a thermal balance, misleading figures have been obtained. Responsible authorities have, therefore, different opinions on the nature of the reactions, some maintaining that during the coal distillation the reactions are mainly endothermic, and others, with equal force, that the sum of the reactions is exothermic. Hollings and Cobb state that at certain temperatures the reactions are distinctly endothermic, gradually passing into the exothermic state, and again reverting to endothermic, and so on.

Recently Davis, Place, and Edelburn carried out some exhaustive research work, from which they conclude that with most coals, particularly those of a younger formation, the liberation of the primary products is usually associated with quite considerable exothermic manifestations. I have given in another place the evidence which we observed that bituminous coal appears to have exothermic reactions at a temperature very often as low as 200°-250° C., and about that temperature, when coal is distilled by means of an inert heating medium, decomposition of the coal occurs, and the first traces of oil and gas, accompanied by combined water, appear. When internal heating is used it is possible to obtain a thermal balance which, when due allowance is made for any unknown factors, which, in this method of distillation are not of serious consequence, gives a picture of the true state of affairs more clearly than in any other way.

The author then gave for the thermal balance a continuous run of seven days of an "L & N" retort using a non-coking Leicestershire bituminous coal.

We ultimately found that the amount of heat, from all sources, entering the retort, *minus* the ascertainable amount of heat which leaves the retort as sensible and latent heat of the gas and vapours, as well as the sensible heat of the distilled residue, and the thermal losses due to radiation and convection, leaves a *minus* quantity of considerable magnitude. This must have been obtained from some other source which can only be the exothermic reaction in the coal during the distillation. Expressed in B.Th.U. evolved per lb. of coal distilled, this figure, approximately 88·5 B.Th.U. per lb. of coal, closely approaches the value observed by Davis, Place, and Edelburn, and others, for bituminous coals of a younger formation. The exothermic reactions, once they have commenced, are quite sufficient to raise the coal to such a temperature that the coal becomes active, while the distillation proceeds at an increased rate. The sensible and latent heat entering the retort are practically identical with the sensible and latent heat leaving the retort, the actual heat requirements are only those necessary for drying the coal and heating this dried coal to a temperature at which the exothermic reactions begin.

According to the observed facts and figures, the exothermic reactions of bituminous coal of a younger genus play quite a prominent part in the actual distillation, indeed much more so than is commonly believed. Up to the present, by the usual externally applied heating method, be it by high or low temperature, it has not been possible to obtain any data on the exothermic or endothermic reactions which could stand the acid test of close scrutiny, but I believe that by internal heat application we have been able to throw some more light on this debatable point, all the more so since the tests have been carried out with hundreds of tons of coal and the margin of error during the observations is reduced to a minimum.

Discussion.

Engineer-Captain J. Fraser Shaw (Chief Engineer to the Fuel Research Board) said that, while it was true that internal heating was a more efficient method of supplying heat to coal than external heating, there were certain disadvantages with internal heating, and the one which was the most difficult to overcome was how to deal with the dust which must be carried forward by the very large volumes of gas which were used. Nobody had yet solved that problem, although he did not suggest it was beyond solution. In speaking of the use of low-grade fuel, the author had not explained how he was going to get rid of the ash before the coal was burned, and that was another difficulty. Pulverized fuel firing had shown that it did not pay to use coal containing a large amount of ash, because the extra grinding and the extra cost of the material that came out after combustion was not justified. On the other hand, domestic users of the resultant fuel from low-temperature carbonization processes objected to a fuel which contained a large amount of ash. Having been a salesman of low-temperature coke for some years he felt he knew the market in this respect, although both the points he had raised were matters which should be capable of being overcome.

Prof. W. E. Gibbs said that a very important feature of this process from the chemical engineering standpoint was the transfer of heat from the hot gas to the coal particle, and the practical point from that aspect of the problem was the size of the coal particle which could be used.

The Author replied that experience showed that with intern-

ally heated retorts the size of the coal particle should not exceed 2 in., although the finer it was the better. At the same time, the grinding of the coal should not be carried too far, otherwise the whole mass became resistant. Probably 1 in. or even ½ in. was the limit in order to avoid any trouble from dust.

Sir RICHARD PAGET expressed his admiration of the courage shown in going from a 10-ton plant to a 100-ton plant.

Mr. F. RUMFORD, referring to the author's suggestion that it would easily be possible to pass from the 100-ton plant to a 500-ton plant, asked whether it was not likely the same troubles would be met as were encountered in passing from the 10-ton plant to the 100-ton plant. As regards the concentration of phenols in the liquor, that was fairly small, but the concentration in low-temperature tar was rather high. If the liquor went into equilibrium with the tar it did not seem to him that the fresh tar entering into the circuit would increase the phenol content of the liquor much. Therefore, he was wondering whether the concentrated liquor was only rich in fixed ammonium salts, and that the phenol content was the same as that obtained originally. Was it also possible for a high concentration of phenol to promote emulsion troubles with the tar? It seemed that if the circulating gas was re-circulated it would necessarily be of fairly high calorific value. Therefore, would it be possible eventually to dispense with the producer altogether, and, so to speak, make the plant "eat its own tail" and run like a coke oven? The figures showed that 18 or 19 therms of gas were evolved, and the carbonizing figures indicated that this was about the quantity of gas required. Had the author succeeded in making the plant entirely self-supporting in that direction?

Mr. A. W. GOODLIFFE (Shell-Mex), speaking of the air lubricating oils, remarked that the specific gravities mentioned in the paper seemed to be of a rather high order in comparison with ordinary hydrocarbon lubricating oil, which was composed of the pentane series. The best lubricating oils were of this character, he believed, and the high specific gravity mentioned in the paper seemed to indicate that aromatics or unsaturated hydrocarbons were present to a very large degree. Another point in connection with lubricating oils was that in some experiments recently carried out it had been shown that a most definite splitting up of hydrocarbons took place at about 300° C. This did not produce carbon—he did not know what was produced—but it had proved detrimental to the characteristics of the oil as a lubricant. The temperature practically throughout the whole of the author's rotary retort was about 300° C., and therefore it seemed that a certain amount of decomposition had taken place. Therefore he wished to know if the lubricating oils really had any lubricating properties.

Dr. A. J. V. UNDERWOOD pointed out that in the system in which the author heated the coal by burning producer gas, there was no provision for recovering the tar before it reached the furnace, and that tar, presumably a valuable product, was burned in the furnace. He had seen a similar plant at work in Germany dealing with brown coal distillation, and in that case the tar was recovered.

Mr. C. S. GARLAND asked if the author, without giving away any secrets, could say something on the question of the economic balance of his system.

Mr. P. C. POPE (Secretary, Institute of Fuel) said he had been privileged to see the author's plant and had made some inquiries as to the calorific value of the producer gas leaving the retort, and found it was of the order of 20 B.Th.U. per c.ft., but it was not considered worth while scrubbing for the recovery of any light spirit in it. While a truer primary tar was obtained with internal heating than by any present method of external heating, was the value of the tar so much higher than the tar produced by the external heating process as to compensate for the loss of heat thrown away in the rich gas produced, and the fact that no light spirit was scrubbed? In externally heated retorts it was normal to obtain from 1¾ to 2¼ gallons of spirit which had a value of at any rate 9d. per gallon. Also the rich gas produced from an externally heated retort was sufficient to heat the retort, and therefore save all the coal that now had to be used in the author's process.

Mr. P. PARRISH said that whether the large retorts of the future would be heated internally or externally was a moot point. With a system of internal heating the crude gas was largely valueless, and efficient recovery of the light spirit was well-nigh impossible. He would be inclined to favour a system of external heating with producer gas, and the recovery of the undiluted low-temperature gas, which might be suitably cracked at a subsequent stage to a gas of normal calorific value. Such crude low-temperature gas would be worth at least 1d. per therm more than the heating medium. What the exploiters of low-temperature carbonization processes had failed to realize was the relative importance of the crude gas as an item of revenue, particularly where low-temperature carbonizing installations were erected in industrial areas remote from the coalfields. Such crude gas might well prove to be of greater pecuniary significance than the oil, on which the major efforts of the pioneers, and, indeed, others, had been concentrated. He (Mr. Parrish) did not wish to disparage the importance or value of the tar oil, but desired to emphasize an aspect which had apparently been insufficiently considered. On the subject of the exothermic nature of the low-temperature carbonizing process, which Mr. Nielsen's recent work on a large scale had revealed, he would remind them that Cobb and Hollings had undertaken an investigation into this aspect, and had shown that at certain temperatures the reactions were endothermic, and subsequently exothermic, and that on the balance the process was slightly exothermic. This work was undertaken prior to that of the American scientists to whom Mr. Nielsen had made reference. Mr. Nielsen had dealt with his subject in a comprehensive way, but there were certain phases that he had only touched upon in a cursory manner. What was Mr. Nielsen's idea of low-temperature fuel, and what would he regard as desirable physical features?

He himself had had experience of the K.S.G. and the Coalite processes. The K.S.G. process had many features that were commendable, but the Coalite process appeared to be the one which held the field to-day. It had the merit of simplicity, it was free from complicated mechanisms, and—what was of major importance—it produced an attractive low-temperature fuel of robust strength and suitable size. Mr. Nielsen would be faced with difficulties in the disposal of the material produced by his process, unless the coal was carefully selected from the viewpoint of its ash characteristics. Nothing was calculated to create dissatisfaction with the consuming public more than a low-temperature fuel which on combustion gave rise to a fluffy impalpable ash, which was distributed throughout the fire. If the banded formation of the ash in the original coal could be maintained, or partially maintained, and a suitable size standard established, these features would constitute good selling points, and would go far to create an automatic demand for low-temperature fuel. The use of de-ashed coal for the production of low-temperature fuel would represent an ideal, and might justify adoption. De-ashed coal would ensure (*a*) greater throughput, (*b*) better heat transmission, because the shaly particles impeded heat transfer, and (*c*) the quality of the final smokeless fuel would largely sell itself. If de-ashed coal was a paragon, commercially unattainable to-day, then coals must be carefully selected, with due regard to many characteristics, if a satisfactory low-temperature fuel was to be produced.

Dr. W. R. ORMANDY said that, while a tribute should be paid to the author for tackling this problem, a tribute should also be paid to those who were financially backing the author. There was little doubt that low-temperature carbonization by internal heating was a most successful means for getting a real low-temperature tar. He had been interested in what the author had said with regard to fractional condensation, because it did seem rather stupid that in distilling coal the whole of the volatile products were distilled into one batch containing high, low, and medium boiling point materials, and then they carefully proceeded to distil them again to get them into the form in which they were originally. The idea of fractional cooling was most beautifully carried out by Walter Feld on a range of coke ovens running on lignite coal in Austria, and the unfortunate early death of Feld put an end to what was a most promising line of development. The author had stated that, although he was using a coal containing 20 p.ct. of ash, he was getting a coke which contained only 5 or 6 p.ct. of ash. Presumably a very badly banded coal was used, and due to the mechanical breaking down the ash could be shaken out, and the smaller particles of coke consequently contained this smaller quantity of ash. The question of the maximum amount of ash allowable in a fuel in which the public was likely to take an interest was emphasized in a paper which he himself recently read. One of the main troubles with internal firing systems was the smalls, and he did not believe that the progress of coal dust firing would proceed at such a rate in any one area as to utilize all the coke produced. Therefore, it must be briquetted. But briquetting coke with pitch led to smoke, and it used a large amount of pitch. The representative of Shell-Mex had made one or two curious statements. He had suggested that lubricating oils consisted essentially of straight chain paraffins, but he (the speaker) had a sort of hazy idea that the worst lubricants were those which consisted of straight chain paraffins, and that it was necessary to have naphthenes and a certain amount of unsaturateds to get a really good lubricant. Would the author say what physical tests had been carried out on the lubricating oils with some of the well-known oil-testing machines, such as the Deeley? If financial figures were to be given, what was the capital cost per ton throughput per annum for the plant independent of the oil refinery?

THE AUTHOR'S REPLY.

Mr. NIELSEN, in the course of a brief reply to the discussion, said he did not anticipate any trouble in going from the 100-ton plant to the 500-ton plant; indeed, he regarded the change from 10 tons to 100 tons as a much bigger step, and he failed to see what could happen in the 500-ton plant which would increase the difficulties or create new ones. Tests had proved that some of the lubricating oils obtained with the process were able to withstand pressures and temperatures which a good grade of other lubricating oil would not stand. For instance, on a modified Deeley machine it had been found that, whereas a good grade of well oil broke down at 800 lbs. and 90° C., a coal oil stood up to 1200 lbs. and broke down at 90°. The machine was running at 1300 r.p.m., so that it was quite a severe test. Specific gravity was not the only test of a good lubricating oil; there was also the question of emulsification when used on some journals, although a high specific gravity was of importance. In reply to Mr. Garland on the question of economic balance, personally he knew very little about the business side, but he could say that at Ashby the operating costs, including depreciation, labour, maintenance, &c., worked out at 4s. 6d. per ton. Depreciation was rather low because the plant was much on the lines of a cement kiln, and there was no reason why the depreciation should not be equally low. As to the waste of gas, mentioned by Mr. Pope, at the Ashby plant, they were not interested in the gas, and as with these high viscous oils there was relatively little cracking, the amount of petrol that might be recovered was very small, probably not

more than a gallon or a little more; and even if it went to 2 gallons he did not think it would pay at the moment to recover it. In reply to Mr. Parrish, he said that if he could get 3d. per therm for the gas he would go on producing that only, but he believed that in the Sheffield district the coke oven people were glad to get 1½d. per therm, or something like that. At a modern gas-works it cost 3d. per therm to make gas, and then there were the distribution system costs to be taken into account. It was apparent that a low-temperature plant at an ordinary gas-works would be useful because the low-temperature gas would effect the same thing as the oil used for carburetting gas. He could not follow Mr. Parrish's remarks with regard to eliminating ash in coke, because low-temperature coke gave very effective combustion, and he did not think the ash trouble would be very serious. Those working the low-temperature process knew what the customer wanted, and seemed to be able to satisfy him and to get a very good price for the coke. A detailed reply in writing was promised to the other points raised.

A cordial vote of thanks was passed to Mr. Nielsen at the close of the discussion, on the motion of Mr. GEORGE GRAY (Vice-President), who was in the chair.

NOTES ON PLANT AND PROCESSES

An Improved Winch.

Our illustration shows the improved winch made by the London Electric Firm, South Croydon, which gives a ratio of 1/1—*i.e.*, one turn of the handle gives one revolution of the barrel, as distinct from several turns under the old scheme of reduction gear. Hence the lamp or other weight can be lowered or raised at the quickest possible speed, and yet the load is self-sustaining in every position. Whether the handle is let go by design or accident it automatically stops without the slightest risk of running away. The firm have been making these hand winches for nearly thirty years, and during that period have supplied about a million throughout the world. They are stocked for dealing with all weights up to 10 cwt.

Metropolitan Gas Companies' Testings.

The Gas Referee's report on the official testings for the past quarter gives the following average calorific values for the gas supplied by the Metropolitan Companies named.

Commercial Gas Company.—501·6 B.Th.U. (declared calorific value, 500 B.Th.U.).

Gas Light and Coke Company.—503·7 B.Th.U. (declared calorific value, 500 B.Th.U.).

South Metropolitan Gas Company.—561·3 B.Th.U. (declared calorific value, 560 B.Th.U.).

South Suburban Gas Company.—563 B.Th.U. (declared calorific value, 560 B.Th.U.).

Tottenham and District Gas Company.—501·2 B.Th.U. (declared calorific value, 500 B.Th.U.).

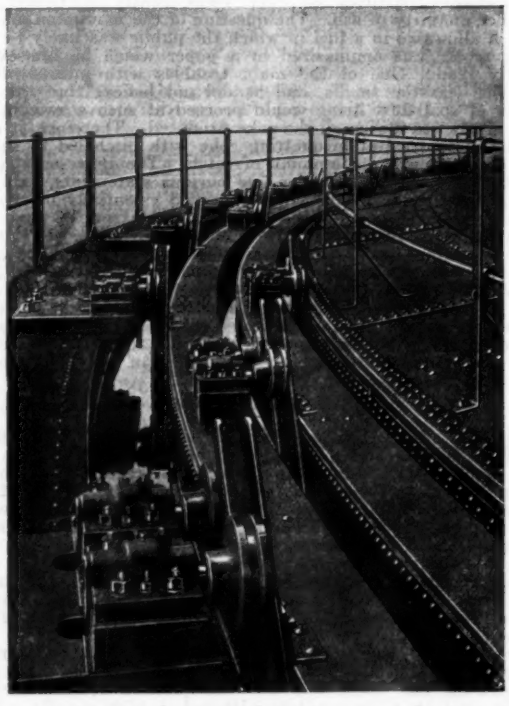
Wandsworth and District Gas Company.—501·6 B.Th.U. (declared calorific value, 500 B.Th.U.).

New Capital Issues.

Dover Gas Company.—The tenders for the £17,500 of new stock were opened on April 28, the issue being over-subscribed at prices ranging from £135 down to the minimum of £125 per £100, the average obtained being £129 19s. 10d. p.ct.

The Mid-Southern District Utility Company (formerly the Aldershot Gas, Water, and District Lighting Company) is offering for sale by tender £100,000 4 p.ct. consolidated preference stock at a minimum price of £75 per £100 stock. The yield at this price works out at £5 6s. 8d. p.ct.

Wandsworth and District Gas Company.—The Directors of this Company invite tenders for £125,000 of 5 p.ct. preference stock at a minimum price of issue of £99 10s. per £100 of stock. Tenders must be accompanied by a deposit of 10 p.ct. of the nominal amount of stock, and must be received not later than 12 noon on Thursday, May 5.



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PARLIAMENTARY INTELLIGENCE

[From Our Special Correspondents.]

House of Lords.

Private Bills.

The Scarborough Gas Bill has been read a first time, referred to the Examiners, and put down for second reading.

The Gas Light and Coke Company's Bill has been referred to a Committee, consisting of the Marquess of Bath (Chairman), the Earl of Eldon, Lord Wharton, Lord Ellenborough, and Lord Lawrence.

Special Order.

A Special Order on the application of the Shanklin Gas Company has been laid before the House and referred to the Special Orders Committee.

Gas Undertakings (Powers of Investment).

The following Lords have been appointed to the Joint Committee of both Houses to consider the powers of investment of gas undertakings: Lords Fairfax of Cameron, Carnock, Russell of Liverpool, Swinfen, and Marks. Counsel will be admitted before the Committee, which will meet in Committee Room "E," House of Lords, to-morrow, at 11 a.m. The House of Commons has concurred in the Lords proposal, and has appointed the following M.P.s to serve on the Joint Committee: Mr. McKeag, Major McLean, Mr. Nunn, Sir A. M. Samuel, and Mr. Tom Williams. The quorum of the Committee is three.

House of Commons.

Private Bills.

The Scarborough Gas Bill has been read a third time and sent to the Lords.

The Kettering Gas Bill, with amendments, has been considered on report, and was put down for third reading on Monday last.

The Oakham Gas and Electricity Bill has been referred to a Committee on Unopposed Bills, consisting of the Chairman of Ways and Means, the Deputy-Chairman, Sir Bertram Falle, Mr. Charles Brown, and Mr. Logan.

The South Suburban Gas Bill and the Mid-Southern Utility Bill have been referred to Group "F" Committee, consisting of Mr. David Reid (Chairman), Sir Bertram Falle, Col. Ainsworth, and Mr. Edward Williams.

Special Order.

A Special Order on the application of the Shanklin Gas Company has been presented and ordered to lie on the table of the House.

Gas Undertakings (Powers of Investment).

In reply to a question by Mr. Hutchison, the President of the Board of Trade said that he was unable to make any statement as to possible legislation pending the report of the Joint Committee appointed to consider the interim report of the Gas Legislation Committee. (For names of this Committee see above under House of Lords.)

Gas Acts (1920 and 1929) Orders.

SPECIAL ORDER.

Buxton Corporation.

To confer further powers upon the Corporation in regard to their gas undertaking, and, among other things, to empower the Corporation to lay pipes for ancillary purposes; to empower the Corporation to make specifications in regard to the construction and placing of pipes, &c., between mains and meters; to make provision as to charges for a stand-by supply of gas where the consumer has a separate supply; to relieve the Corporation from obligation to supply gas in such circumstances as may be defined in the Order; to empower the Corporation to refuse to supply gas to persons in debt in respect of charges for gas or electricity; to compel gas consumers to repair gas apparatus in cases of danger; and to make provision as to the service of demand notes for amounts payable in respect of the supply of gas.

Mass Production of
STANTON
Standard "Special" Castings
BIG PRICE REDUCTIONS

IMMEDIATE DELIVERY FROM STOCK
The Stanton Ironworks Company Limited Nr. Nottingham

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

Most sections of the Stock Exchange were in a depressed mood last week. This was attributable for the most part to the wave of liquidation which set in on Thursday and also to the uncertainty with regard to conditions abroad, notably the slump in the United States and the news of the possibility of default by some of the Central European States. Except for gilt-edged and other high-class securities, buyers were very scarce, and the prices of many leading industrials are now considerably below the highest touched this year. The event of the week was the prompt over-subscription to the £10,000,000 India Loan, which now stands at a premium.

The Gas Market was one of the few bright spots, and a glance at the Stock and Share List will show the effect on prices. No less than 25 issues increased in value; and though there was less stock available inquiries were numerous. It is quite evident, therefore, that more and more investors are turning their attentions to this section. To illustrate the strength of the market, the following list shows the current middle market price of some of the larger ordinary issues of those companies operating at home compared with the prices ruling during the same week for the past two years, and it will be noticed that in nearly every case values have increased each year. The only depreciation of note is that of the Cardiff Company, but the stock is rarely available, and no transactions have been recorded since December last (at 97), which would account for the present low figure.

Ordinary Stocks.

—	May 2, 1930.	April 30, 1931.	April 29, 1932.
Barnet	110½	126½	127½
Brighton and Hove	114⅜	114½	123½
Bristol	88	95	98
British	112½	112½	114½
Cardiff	97½	97½	94½
Commercial	90½	94½	97½
Croydon sliding-scale	106½	108½	115½
Gas Light £1 units	19s	18s. 6d.	20s. 6d.
Liverpool	90⅞	99⅛	102½
Newcastle £1 units	16s.	17s. 3d.	19s.
Portsmouth	112½	124½	128½
Sheffield	103	104	102
South Metropolitan	103	104½	103½
South Suburban	101½	103½	104½
Southampton	77½	78½	77½
Tottenham	103	104	106
Wandsworth	110½	113½	118½

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *May* 2.

There is no change in the values of tar products, which remain as follows:

Pitch is firm at 95s. per ton f.o.b.

Creosote, for export, varies from 3¾d. to 5d. per gallon f.o.b., according to specification.

Refined tar is 4d. to 4½d. per gallon in bulk at makers' works.

Pure toluole is about 2s. 8d. per gallon at makers' works; pure benzole, 1s. 8d. per gallon; 95/160 solvent naphtha, about 1s. 5d. per gallon; and pyridine bases, 3s. 9d. to 4s. per gallon.

Tar and Tar Products in the Provinces.

May 2.

The average prices of gas-works products during the week were: Gas-works tar, 36s. to 41s. Pitch—East Coast, 85s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 85s. f.o.b.* Toluole, naked North, 1s. 10d. to 1s. 10½d. Coal-tar crude naphtha, in bulk, North, 5d. to 5½d. Solvent naphtha, naked, North, 1s. 2½d. to 1s. 3d. Heavy naphtha, North, 11d. to 11½d. Creosote, *ex* works, in bulk, North, liquid and salty, 3d. to 3⅛d.; low gravity, 1½d.; Scotland, 3d. to 3½d. Heavy oils, in bulk, North, 5d. to 5½d. Carbolic acid, 60's, 1s. 8d. to 1s. 9d. Naphthalene, £9 to £10. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *April* 30.

Quotations for most products continue steady, and a fair volume of business has been placed during the week. Inquiries for cresylic acid are more plentiful.

Crude gas-works tar.—The actual value remains firm at 52s. 6d. to 57s. 6d. per ton *ex* works.

Pitch.—Supplies being scarce export price is nominal at 82s. 6d. to 87s. 6d. per ton f.o.b. Glasgow. Home value is unchanged at 85s. to 87s. 6d. per ton *ex* makers' works in bulk.

Refined tar to Ministry of Transport Specification is changing hands in large quantities, and value is not lower than 4½d. to 4¾d. per gallon f.o.r. naked.

Creosote oil has been attracting more attention. B.E.S.A. Specification is 3½d. to 3¾d. per gallon; low gravity, 3¾d. to 4d. per gallon; and neutral oil, 3¾d. to 4d. per gallon—all *ex* works in bulk.

Cresylic acid.—While orders remain scarce there is a better feeling prevailing. Pale, 97/99 p.ct., is 1s. 1d. to 1s. 2d. per gallon; dark, 97/99 p.ct., 1s. to 1s. 1d. per gallon; and pale, 99/100 p.ct., 1s. 3d. to 1s. 4d. per gallon, f.o.r. in buyers' packages.

Crude naphtha.—Production is low and value is 4½d. to 5d. per gallon, according to quality and district.

Solvent naphtha.—Few orders are being placed. 90/160 is lower at 1s. 2½d. to 1s. 3½d. per gallon, and 90/190 11d. to 1s. per gallon.

Motor benzole.—The recent reduction has not yet resulted in more business. Value to-day is 1s. 2½d. to 1s. 3½d. per gallon.

Pyridines.—90/160 grade is 3s. to 3s. 3d. per gallon, and 90/140 grade 3s. 3d. to 3s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole	0	7	to	0	7½	per gallon at works
Motor ,,	1	2	,,	1	3	,, ,, ,,
Pure ,,	1	6	,,	1	7	,, ,, ,,

Contracts Advertised To-Day.

Coal.

The Mansfield Corporation Gas Committee invite tenders for the supply of coal. [Advert. on Supplement XI.]

The Gainsborough Urban District Council invite tenders for the supply of gas coal. [Advert. on Supplement XII.]

Coke Breaking, Screening, and Grading Plant.

The Middleton Corporation Gas Department invite tenders for the supply of above plant. [Advert. on Supplement XII.]

Gas Mantles.

The City of Birmingham Gas Department invite tenders for mantles, &c. [Advert. on Supplement XII.]

General Stores and Tools.

The City of Birmingham Corporation invite tenders for the supply of various stores and tools. [Advert. on Supplement XII.]

Meters.

The Mansfield Corporation Gas Committee invite tenders for the repair of meters and the supply of new meters. [Advert. on Supplement XI.]

Sulphuric Acid and Lime.

The Mansfield Corporation Gas Committee invite tenders for the supply of sulphuric acid and lime. [Advert. on Supplement XI.]

Tar and Ammoniacal Liquor.

The Mansfield Corporation Gas Committee invite tenders for the purchase of surplus tar. [Advert. on Supplement XI.]

Water Gas Plant.

The Edinburgh Corporation invite tenders for the supply and erection of a carburetted water gas plant. [Advert. on Supplement XII.]

Trade Notes.

New Gasholder for Croydon.

The Croydon Gas Company have recently placed the order with Messrs. Robert Dempster & Sons, Ltd., Elland, for the supply and erection at the Carshalton Works of a steel tank and three-lift spiral-guided gasholder of a capacity of 1,500,000 c.ft.

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

[For Stock Market Report, see earlier pages.]

Issue	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Apl. 29.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
1,551,868	Stk.	Apl. 4	7½	7½	Alliance & Dublin Ord. ...	100—105	+1	100½—103½
374,000	,,	Jan. 4	4	4	Do. 4 p.c. Deb. ...	70—75	...	...
557,655	,,	Mar. 14	7	7	Barnet Ord. 7 p.c.	125—130	...	...
300,000	1	Apl. 29	1/4½	1/9½	Bombay, Ltd.	15/—20/-*	...	...
177,750	10	Feb. 29	9	9	Bournemouth 5 p.c. ...	15—16	+½	...
500,050	10	,,	7	7	Do. B 7 p.c. ...	12⅝—13½	...	13½—13½
439,160	10	,,	6	6	Do. Pref. 6 p.c. ...	11—12	...	...
50,000	Stk.	Dec. 14	3	3	Do. 3 p.c. Deb. ...	58—63	+1	...
162,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	79—84	+2	...
210,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	102—107	+3	...
					Brighton, Hove, & Worthing			
357,900	,,	Mar. 14	7½	7½	6 p.c. Con. ...	121—126	...	124—125
540,000	,,	,,	6½	6½	Do. 5 p.c. Con. ...	108—113	...	...
195,500	,,	,,	6	6	Do. 6 p.c. B Pref.	113—118	+1	116½
1,287,500	,,	Feb. 29	5	5	Bristol 5 p.c. max.	97—99a	+1	...
120,420	,,	Jan. 4	4	4	Do. 1st 4 p.c. Deb. ...	81—83a	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	81—83a	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	97—98a	...	...
855,000	,,	Apl. 4	7	8	British Ord.	112—117	+2	111½—114½
100,000	,,	Jan. 4	7	7	Do. 7 p.c. Pref.	115—120	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	75—80	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	98—103	...	101½
160,000	,,	Jan. 4	5	5	Cambridge 5 p.c. Deb. ...	95—100	...	...
100,000	10	Nov. 30	8	6	Cape Town, Ltd.	7½—8½	...	...
100,000	10	Apl. 29	4½	4½	Do. 4½ p.c. Pref. ...	6—7*	—½	...
150,000	Stk.	Jan. 4	4½	4½	Do. 4½ p.c. Deb. ...	76—81	...	...
626,860	,,	Feb. 15	6	6	Cardiff Con. Ord.	93—96	...	...
237,860	,,	Jan. 4	2½	5	Do. 5 p.c. Red. Deb.	95—100	...	...
157,150	,,	Feb. 15	5	6½	Chester 5 p.c. Ord.	87—92b	+2½	...
98,936	1	Oct. 5	12/-	2/-	Colombo, Ltd. Ord.... ...	27/—32/-	...	...
24,500	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	17/—19/-	...	...
609,204	1	Apl. 4	-/10'90	-/11'47	Colonial Gas Assn. Ltd. Ord.	10/—15/-	...	...
296,053	1	,,	1/2'54	1/3'30	Do. 8 p.c. Pref.	10/—15/-	...	...
2,078,280	Stk.	Feb. 15	6	5½	Commercial Ord.	96—99	+1	97
475,000	,,	Dec. 14	3	3	Do. 3 p.c. Deb. ...	61—64	+2	...
807,560	,,	Feb. 15	7	7	Croydon sliding scale	113—118	+5	...
469,590	,,	,,	5	5	Do. max. div.	82—87	...	...
500,000	,,	Jan. 4	5	5	Do. 5 p.c. Deb.	99—102	...	...
542,270	,,	Feb. 29	7	10	Derby Con.	117—122c	...	...
55,000	,,	Jan. 4	4	4	Do. 4 p.c. Deb.	65—70c	...	...
209,000	,,	Mar. 14	5	5	East Hull Ord. 5 p.c. ...	75—80	...	...
179,500	,,	Feb. 29	5½	5½	East Surrey Ord. 5 p.c. ...	93—98	...	96½
155,019	,,	Jan. 4	5	5	Do. 5 p.c. Deb. ...	97—102	...	...
1,002,180	,,	Mar. 14	†4	†6½	European, Ltd.	90—100	—5	90—97
19,405,992	,,	Feb. 15	5½	5½	Gas Light & Coke 4 p.c. Ord.	20/—21/-f	...	20/1½—20/7½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	63—66	...	64½—66
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	81—85	+1	82½—84
6,102,497	,,	Dec. 14	3	3	Do. 3 p.c. Con. Deb. ...	64—67	...	65½—67
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	103—106	+2	104—105
2,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	95—98	+1	96½—97½
162,280	,,	Feb. 29	10	10	Harrogate Cons. 10 p.c. max.	157—162	...	...
82,500	,,	Mar. 14	7	7	Hastings & St. L. 5 p.c. Conv.	97—102	...	...
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	82—87	...	...
70,000	10	9 Oct. '30	½	10	Hongkong & China, Ltd. ...	11—12	...	11¼—11¼
213,200	Stk.	Feb. 29	6	6	Hornsey Con. 5½ p.c. ...	87—90	...	...
5,600,000	,,	Oct. 30	25	15	Imperial Continental Cap.	166—175	...	165—170½
223,130	,,	Feb. 1	3½	3½	Do. 3½ p.c. Red. Deb.	70—75	...	...
235,242	,,	Mar. 14	8½	8½	Lea Bridge 5 p.c. Ord. ...	131—136	...	...
2,145,907	,,	Feb. 29	6	6	Liverpool 5 p.c. Ord. ...	101½—103½b	+1½	...
245,500	,,	—	—	5	Do. 5 p.c. Red. Pref. ...	97—102b	...	...
306,083	,,	Jan. 15	4	4	Do. 4 p.c. Deb. ...	85—90b	+6½	...
165,736	,,	Feb. 15	8	10	Maidstone 5 p.c. Cap. ...	124—129	...	...
56,176	,,	Jan. 4	3	3	Do. 3 p.c. Deb. ...	55—60	...	...
75,000	5	Nov. 30	†10	†10	Malta & Mediterranean ...	6½—7	...	...
					Metropolitan (of Melbourne)			
392,000	—	Apl. 1	5½	5½	5½ p.c. Red. Deb.	77—82	...	...
171,978	Stk.	Feb. 29	5	5	M. S. D. Utility "C." Cons.	76—81	...	...
718,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	70—75	...	...
112,126	,,	g	4	4	Do. 4 p.c. Deb. ...	77—82	...	...
148,955	,,	g	5	5	Do. 5 p.c. Deb. ...	97—102	...	...
675,000	,,	May 21	†6	†6	Montevideo, Ltd.	60—70	—10	...
2,061,315	,,	Feb. 29	5	5½	Newcastle & Gateshead Con.	18/6—19/6d/	+-/6	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	75—76d	...	...
691,705	,,	Jan. 4	3½	3½	Do. 3½ p.c. Deb. ...	68—70d	+1½	...
277,285	,,	Oct. 30	5	5	Do. 5 p.c. Deb. '43...	97—99d	...	...
199,940	,,	Mar. 14	7½	7½	North Middlesex 6 p.c. Con.	106—111	...	...
396,160	,,	Feb. 15	5	5	Northampton 5 p.c. max. ...	78—83	...	...
300,000	,,	Apl. 18	9	7	Oriental, Ltd.	85—95*	...	...
305,162	,,	Jan. 4	8	8	Plym'th & Stonehouse 5 p.c.	127—132	+6	...
504,416	,,	Feb. 15	8	8	Portam'th Con.Stk. 4 p.c.Std.	126—131	+2	128
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	78—83	...	...
114,000	,,	Feb. 15	5	5	Preston 5 p.c. Pref.	94—99	...	...
686,313	,,	Jan. 18	4	4	Primitiva 4 p.c. Rd. Db. 1911	77—82	...	...
889,813	,,	Jan. 4	4	4	Do. 4 p.c. Cons. Deb.	77—82	...	...
150,000	10	Apl. 4	6	6	San Paulo 6 p.c. Pref. ...	7—7½	...	...
1,786,963	Stk.	Apl. 4	6	6	Sheffield Cons.	101—103e	...	...
95,000	,,	Jan. 18	4	4	Do. 4 p.c. Deb.	79—81e	...	...
133,201	,,	Feb. 29	8½	5	Shrewsbury 5 p.c. Ord. ...	88—93	...	...
90,000	10	June 11	†5	†5	South African	3—5	...	...
6,709,895	Stk.	Feb. 15	5	7	South Met. Ord.	102—105	...	103—104
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	113—118	...	116½—118
1,895,445	,,	Jan. 4	3	3	Do. 3 p.c. Deb. ...	63—66	...	...
1,000,000	,,	Jan. 18	4	5	Do. 5 p.c. Red. Deb.	100—104	...	...
91,500	,,	Feb. 29	8½	8½	South Shields Con.	125—127d	...	...
1,548,795	,,	Feb. 15	6½	6	South Suburban Ord. 5 p.c.	102—107	...	...
300,000	,,	,,	5	5	Do. 5 p.c. Pref.	97—102	+1	99—100½
668,837	,,	Jan. 4	5	5	Do. 5 p.c. Deb.	99—104	...	...
647,740	,,	Feb. 29	5	5	Southampt'n Ord. 5 p.c. max.	75—80	...	...
121,275	,,	,,	4	4	Do. 4 p.c. Deb.	77—82	+2	...
250,000	,,	Aug. 24	7	7	Swansea 7 p.c. Red. Pref. ...	98—102	...	...
200,000	,,	Jan. 4	6½	6½	Do. 6½ p.c. Red. Deb.	99—102	...	...
1,076,490	,,	Feb. 29	6½	6½	Tottenham and District Ord.	104—108	...	...
300,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	93—98	...	...
199,005	,,	Dec. 14	4	4	Do. 4 p.c. Deb. ...	77—82	...	...
85,701	,,	Apl. 4	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	70—75	...	...
					Uxbridge, Maidenhead, &			
346,069	,,	Feb. 29	7	7	Wycombe 5 p.c.	100—105	...	...
88,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	90—95	...	...
					Wandsworth and District:			
1,322,220	,,	Feb. 29	7	7	Consolidated	116—121	+1	118—119
971,373	,,	,,	5	5	Do. 5 p.c. Pref.	97—102	...	99—101
1,167,964	,,	Jan. 4	5	5	Do. 5 p.c. Deb.	102—105	+2	103½—104½
158,400	,,	Feb. 29	5	6A	Winchester W.&G.5p.c.Con.	83—88	...	...

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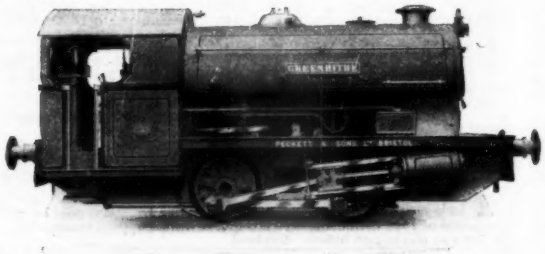

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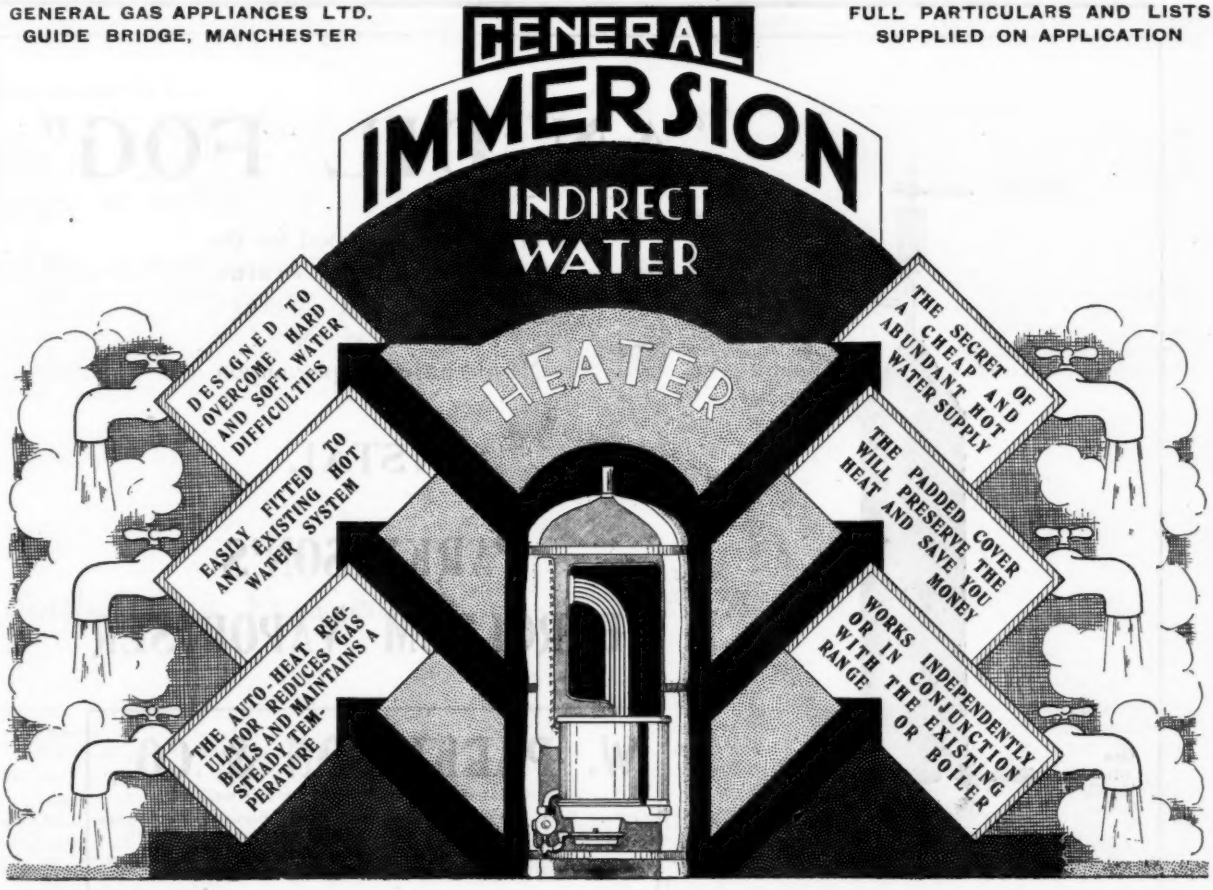
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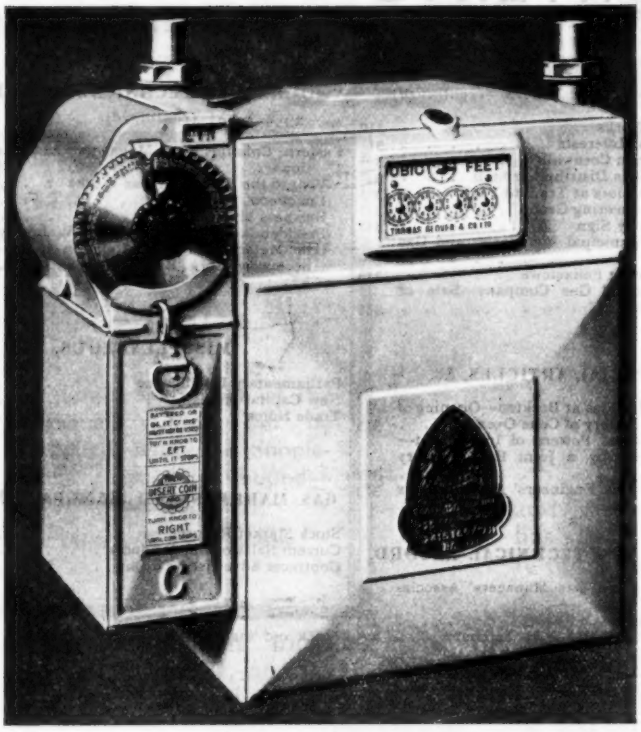

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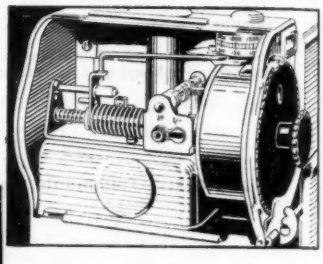

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